

HEALTH CARE WITHOUT WALLS

A Roadmap for Reinventing
U.S. Health Care

Susan Dentzer, Editor



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REINVENTING
U.S. HEALTH
CARE

(EXECUTIVE SUMMARY)

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ACKNOWLEDGMENTS

THIS REPORT was produced under the auspices of the Health Care Without Walls initiative, a program of the Network for Excellence in Health Innovation (NEHI). NEHI is a nonprofit, nonpartisan organization with nearly 100 members across all key sectors of health care. NEHI's mission is to advance innovations that improve health, enhance the quality of health care, and achieve greater value for the money spent. NEHI convenes and consults with its membership, and conducts independent, objective research and convenings, to accelerate these innovations and bring about changes within health care and in public policy.

The Health Care Without Walls initiative would not have been possible without the generous support of a number of several organizations: the Gordon and Betty Moore Foundation; the Jewish Healthcare Foundation (JHF); the California Healthcare Foundation (CHCF); Sanofi; the Inova health system; and Advanced ICU Care. We especially thank Julie Lawrence of the Moore Foundation; Karen Wolk Feinstein of the JHF; Barbara N. Lubash, Board Member Emerita of CHCF; Amit Rastogi, MD, of Inova; and Andrea Clegg of Advanced ICU Care for their enthusiastic support of the project. The program was carried out by five work streams, focused on technology, payment and reimbursement, regulatory issues, the health care work force, and human factors issues.

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- **Regulatory Issues:** James Boiani, JD, Member of the Firm, Epstein Becker Green, and Andrea Clegg, MBA, Chief Financial Officer, Advanced ICU Care.
- **Work Force:** Julene Champion, MS, SPHR, SPC, Vice President, Talent Acquisition, Geisinger Health System; Anita McDonnell, RPh, Former Vice President, Government Health Initiatives and Political Action, Sanofi; and Carla Smith, MA, CNM, FHIMSS, Executive Vice President, HIMSS
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Several writers also assisted in preparation of draft chapters of this report, as follows: Joan Stephenson, Steven Findlay, Charles Babington, Helaine Resnick, and Erin Hammers Forstag. I thank them for their diligent and thoughtful work. Finally, members of the NEHI team worked tirelessly to support the Health Care Without Walls initiative and the execution on this report: Valerie Fleishman, Lauren Choi, Tim Tassa, Yaminah Romulus, Sanja Mutabdzija, Tom Hubbard, Pamela Milton, Amanda Mehlman, and Margo Perez. I thank them, most of all, for being marvelous colleagues, dedicated to the work of improving health and health care.

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Washington, DC, October 2018

HEALTH CARE WITHOUT WALLS: INTRODUCTORY CHAPTER IN BRIEF

1. A health care system based on “Health Care Without Walls” could be construed as a system that came to people, meeting them where they are, in their homes, workplaces, or elsewhere in their communities—rather than expecting people to always go to it. It would be a health-inducing system that worked to keep people as healthy as possible, and, if people became ill because the system had failed to prevent it, would recognize that as a failure. It would also be as convenient and accessible as other elements of life that people now take for granted, such as sending money with an app on a mobile phone, or ordering groceries online.
2. NEHI, the Network for Excellence in Health Innovation, conducted a year-long investigation into the opportunities and challenges that confront Health Care Without Walls, aided by approximately 200 experts and health sector participants. In this report, it concludes that it is a national imperative to move more toward a system of Health Care Without Walls to capture a range of benefits—from vastly improved access to care for people living in underserved parts of the United States, to increased cost-efficiency in the provision of care.
3. Many different types of people could benefit from, and even thrive, in such an environment, ranging from relatively healthy consumers who need occasional access to the health care system, to individuals with serious health challenges, such as chronic illnesses like diabetes and heart disease, or

mental and behavioral health issues. NEHI has sketched a number of hypothetical scenarios in this report that suggest how various types of people and patients could benefit.

4. Multiple examples of more “distributed” or “virtual” care already exist, so a system of “Health Care Without Walls” is not a pipe dream. As the science fiction writer William Gibson once remarked, “The future is already here—it's just not very evenly distributed.” A prominent example is the Kaiser Permanente health system, which now covers nearly 1 in every 30 Americans, in which 50 percent of the roughly 120 million patient encounters annually now take place over the phone, email, or video. The “digitization” of health care information over the past two decades has paved the way for increased use of distributed health care modalities.
5. Not all aspects of health care can or should be “delivered” outside of conventional institutional settings. Trauma centers, intensive care units, surgical settings and other places where “laying on of hands” occurs will not and should not disappear. “Distributed” health care outside of these settings will mainly be forms of health care that involve exchanges of information, which have moved to more virtual platforms in most other aspects of contemporary society already. As some observers have put it, the lag in adoption of technology into health care means that the system is one that delivers “Star Wars” medicine, but on a “Flintstones” delivery platform.
6. Nonetheless, NEHI found that substantial opportunities exist to equip health sector workers with technologies to advance more distributed care—so many that technology is clearly not the rate-limiting factor in the growth of Health Care Without Walls. Other trends under way in health care could also speed the evolution of more distributed care strategies, such as the growing use of “precision medicine,” or health care that is tailored to particular patients or groups of patients through such strategies as genetic or molecular profiling.
7. Certain negative trends under way in U.S. health and health care make moving to a system of more distributed health care especially urgent. The high costs and, in particular, the high prices within U.S. health care warrant the need to experiment with cost-saving strategies, such as reducing the high labor cost component of health care, or the costs of maintaining large physical footprints of health care institutions. Poor access in many communities to adequate care, and a maldistribution of care providers,

demand strategies to make better use of the existing health care work force. And the poor and, in many instances, worsening health of much of the population also requires a focus on upstream drivers of poor health status—the social and economic determinants of health—and the movement of care outside the walls of health care in order to address them.

8. Despite the potential of Health Care Without Walls, multiple obstacles stand in the way. Current modes of paying for health care frequently do not support provision of more distributed care, and new payment models should be devised to support it. Regulatory constraints at the state and federal level pose challenges, and in many instances, regulatory structures will need to be revised to accommodate more distributed health care. Today's health care work force is not educated, trained, or equipped well to deliver more technology-driven care. Human factors—the myriad ways technology may or may not be designed to be used well by human beings, and how humans adopt and adjust to technology— may be either enablers or obstacles.
9. NEHI's report contains recommendations in all five of these areas— technology, work force, payment, regulation, and human factors. The recommendations are aimed at a diverse group of people and entities, including policy makers, technology developers and users, health care systems, payers, those in charge of educating and training tomorrow's health care workers, and other stakeholders. The recommendations are designed to expedite the appropriate movement to more distributed care and in essence, “predict” the future by creating it.



TECHNOLOGY & HEALTH CARE WITHOUT WALLS: CHAPTER 1 IN BRIEF

1. The Information Age and digital revolution have given rise to a host of technologies that are enabling the evolution of “distributed” health care outside of conventional institutional settings. Many of these technologies are described in the “Glossary” section of this chapter of the report. Because of these technologies, it is increasingly possible to contemplate what were once seemingly futuristic scenarios—such as an elderly patient with a heart condition being monitored remotely, alerted by his health care providers in the event they detect an issue with his heart rate, and dispatching an autonomous (driverless) “medi-car” outfitted with medical sensors and other testing and communication devices to further assess his condition.
2. The beginnings of this technological transformation of health care are already evident in the home and in other settings. Technologies such as wearable sensors and smart phones, along with capabilities such as artificial intelligence, machine learning, and advanced data analytics, hold the promise of more effective ways to support individuals in preserving their health, as well as to predict, diagnose, and treat disease, enabled by collection of personalized data (from wearable sensors, smart phones, genomics, and other data sources) and the use of artificial intelligence, machine learning, and data analytics.
3. All of these technologies, including digital tools and new channels for delivering health care services in a system built on “Health Care Without Walls” concepts, offer potentially large benefits to individuals and to the nation. Put simply, the vision within reach is of a health care system that is far more accessible and convenient, improves quality of care, removes some of the friction in health care, makes better use of clinicians, improves care coordination, “democratizes” care through the spread of knowledge and

expertise, facilitates public health and population health strategies, potentially lowers the cost of care, and offers a host of other benefits as well.

4. The Technology Work Stream of the Health Care Without Walls initiative was charged with examining current and future technologies that could realistically be in place, and widely used, in the U.S. health care system in 2025, assuming that barriers to their adoption were addressed. The work stream crafted a vision of the future through a set of scenarios depicting care options for various patients and populations, and detailing how care could be delivered to them with the aid of an array of technologies. It also helped to identify barriers to deployment and take-up of technologies, in conjunction with the other work streams, and drafted recommendations for changes in public policy and within health care organizations, payers, and others, to support the 2025 technology vision and stimulate advocacy to achieve this vision.
5. The Technology Work Stream concluded that technologies used in the delivery of Health Care Without Walls should have common elements and key features, including usability across many different types of patients and providers; transparency as to the underlying digital coding and algorithms of any technology, so that any biases or other limitations can be detected; interoperability; a commitment to data sharing and information and exchange, albeit within a framework that enhances data privacy and security; and seamless connectivity with other technologies. These technologies should be able to depend upon universal internet and affordable high-speed broadband access nationwide.
6. The Technology Work Stream noted numerous challenges to the adoption of technology, including those that will be discussed in subsequent chapters around payment, regulation, and the work force. Beyond these, which will be discussed at length, it noted that the history of adoption of information technology in health care is riddled with examples of hugely expensive projects gone awry. In particular, the adoption of electronic health records technology has been plagued by huge costs, a perceived lack of usability, and failure to achieve system-wide interoperability. It will be critical to avoid the mistakes of the past as new technologies are adopted into health care.
7. The work stream made a series of recommendations about how to advance Health Care Without Walls from a technological standpoint.

8. First and foremost, there should be a serious nationwide effort to foster greater connections among entrepreneurs, technology developers, and clinicians to flesh out the Health Care Without Walls vision, and to articulate the most important challenges that clinicians, consumers, and payers face in adopting and using technology. The federal government could lead the way, in partnership with states, technology companies, and leading health care organizations.
9. A blueprint or toolkit should be created, perhaps through a public-private initiative, to provide guidance to health care organizations and systems about acquiring and implementing technologies to enable more virtual and distributed care. An evidence base should be created and disseminated on the cost-effectiveness of technologies and the effects on patient outcomes and costs.
10. Partnerships should be created between technology developers and small or safety-net health systems and critical-access hospitals to develop and/or adapt technologies to their specific needs and cost structures. The federal government should provide seed money for small or safety-net systems and rural hospitals to develop new prototypes of technology-enabled, distributed care suitable in their settings.
11. Technology developers, and health system purchasers, should predicate all development and purchase of technology on the basis of total interoperability, seamless data and information exchange, high-quality data, and total data accessibility with appropriate privacy and security safeguards.
12. Technology innovators should take a range of health care and human factors into account and address them as they create and adapt technologies to enable more distributed care. These include supporting team-based care and the clinician-patient relationship; freeing up clinicians' time so they can spend more time with patients, particularly those with complex health issues; making the health care experience more seamless for patients; improving clinical work flow; and promoting the coordination of care. In addition to thinking through how technologies can best address such issues, technology developers at any early stage of their work must understand the proper audience or customer base for a product, and consider the net downstream costs of implementing it.

13. Technologies should be developed in such a way that they are usable for people with low health literacy, cognitive difficulties, and other physical and mental disabilities. Strategies should be developed to help reach **and** educate uninsured/underinsured people, and/or people with low literacy/health literacy, about the digital health care services that are or will be available to them.
14. Technologies should be developed with a commitment to advancing health equity—the notion that everyone has a fair and just opportunity to be healthier, and that obstacles to health such as poverty, discrimination, and lack of access to education should be removed. Technological solutions must thus be based on data that are inclusive of underserved populations or those that are poor, lack access to education, optimal housing and other social and economic determinants of health and obstacles to greater health.
15. Technologies should also be developed that can help health systems address the social and economic determinants of health and/or match patients to organizations and services that can help address their social needs. For example, analysis of EHRs that have been expanded to include a wealth of information from diverse sources (such as claims data from payers, patient data from providers and from patient questionnaires asking about social determinants, demographic data, environmental data, and other information) could help identify factors affecting the health of individuals and populations and point to useful interventions. Such information can be used to link patients with government programs and other resources such as housing, food banks, and utility reconnection services.



PAYMENT & REIMBURSEMENT FOR HEALTH CARE WITHOUT WALLS: CHAPTER 2 IN BRIEF

1. The role of economic incentives—i.e., payment and reimbursement of health care providers, as well as other actors in the system—is critically important in health care, especially in the United States, with the largest and costliest health care system in the world. The Payment and Reimbursement Work Stream of the Health Care Without Walls initiative considered how payment and reimbursement policies within health care would best support the movement toward more distributed forms of health care, more focus on the upstream drivers of health status, and adoption and use of a broad range of technologies in the new delivery platform.
2. Payment in the U.S. health care system is complex, and technology is paid for in especially complicated and variable ways. In effect, technology is most often paid for indirectly rather than directly. Payment is customarily made to providers for performing services; compensation for the use of any technology effectively incorporated into the determined payment amount. Payment for services may also yield revenues that providers use to make capital investments in technologies that are depreciated over time, as with any other business.
3. Government and public payers also influence the acquisition of technology by health care providers in ways other than direct payment for services. Examples are “certificate of need” programs aimed at regulating construction or creation of new health care facilities or acquisition of

technologies such as imaging, as well as government-led efforts to spur acquisition of health information technology over the past two decades.

4. The work stream found that, to date, some payers have been reluctant to pay for approaches and tools, such as telemedicine, at the heart of more distributed health care. Payers have sometimes feared that use of virtual care will be inferior in quality to in person care; that it will add to costs without improving health, or that it will fail to reduce medical expenditures. As a result, the payment and reimbursement work stream sought to incentivize the shift to a more flexible health care system that allows for more distributed care, and adoption of the technology that would enable it, while avoiding the addition of more cost and complexity to the payment system or further incentivizing delivery of low-value services.
5. The work stream also weighed its recommendations against the backdrop of a U.S. health care system that is transitioning—albeit slowly—from fee-for-service payment to value-based payment. The work stream found that the transition to a more innovative and adaptive system of care in the U.S. would best be achieved via global budgets, capitated systems of payment, and at-risk contracting. However, given the long transition under way from fee-for-service payment to alternative payment models, a “glide path” approach will be needed to greater value-based payment and enhanced use of innovative technologies at the same time.
6. The work stream divided its recommendations into several categories, including recommendations that related to specific new payment incentives for providers; new or expanded federal and state government experimentation with alternative payment models or other novel payment approaches; new incentives aimed at, or to be adopted by, commercial payers and self-insurers; and new financial incentives aimed at patients, individuals, and families themselves.
7. For health care providers and systems, the work stream posited that a variety of new incentives could be created or expanded to incentivize the transition to more distributed modes of health care delivery. These could include episode-based payment or bundles that would enable providers to make use of a range of information and other technologies in the delivery and management of care.

8. With respect to public payers such as Medicare and Medicaid, Congress should direct the Centers for Medicare and Medicaid Services and the Center for Medicare and Medicaid Innovation (CMMI) to expand the volume of demonstrations that included new technology enabled care management and delivery models, to determine whether these models can reduce Medicare and Medicaid expenditures while preserving or enhancing the quality of care. For example, CMS should evaluate the prospect of incorporating distributed care into ongoing dual eligible experiments and payment and delivery reforms, as well as in palliative care and hospice programs. It should also encourage the use and assessment of telehealth and other technology enabled tools in Programs of All-Inclusive Care for the Elderly, or PACE, a unique capitated managed care benefit for the frail elderly. CMS also should expand its Health Care Innovation Awards program to specifically test Health Care Without Walls approaches.
9. CMS should incentivize Medicare Advantage plans to test new models of care and payment, and to accelerate the transition to global budgets and at-risk contracting for providers. CMS also should expand the existing Medicare Value-Based Insurance Design model¹ to permit MA plans more leeway to test approaches to distributed forms of care coupled with lower cost-sharing for beneficiaries.
10. More states should consider seeking waivers from CMS to emulate a variety of payment experiments in Medicare and Medicaid, including Maryland's all-payer rate setting system; "Section 1115" Medicaid waivers, including Delivery System Reform Incentive Payment (DSRIP) waivers; the Pennsylvania Rural Health Model, under which that state seeks to increase rural Pennsylvanians' access to high-quality care and improve their health, while also reducing the growth of hospital expenditures across payers; and Vermont's All-Payer Accountable Care Organization (ACO) Model. All of these experiments contain inherent incentives to test whether distributed care approaches can substitute for more costly services and improve community-level care.
11. The Health Resources and Services Administration should recommend to Congress, and Congress should enact, federal legislation that permits community health centers to more broadly experiment with distributed care.
12. Congress should create large-scale transformation grants to rural and safety net providers, such as critical access hospitals, to enable them to shift away

from their current acute care models and toward becoming community-based health care providers that serve as telehealth facilitators, primary care clinics, substitute observation units for inpatient beds, and provide transport to larger hospitals in more urban settings as needed. The grants would be funded by taxpayers, but could be financed through payment offsets or assumptions about shifts in payment.

13. Other changes should be undertaken by commercial health plans and self-insured employers, or should be instituted in laws and regulations affecting them, to support the shift to more distributed care. For example, commercial payers could be allowed to count their own investments in new technologies enabling more provision of distributed care as a medical expense for the purposes of the Medical Loss Ratio, rather than as administrative or overhead costs. Self-insured employers could count contributions for health-related technologies that patients used in their homes as part of employer-provided wellness programs, and therefore given tax-free to eligible employees.
14. Patients, consumers, and family caregivers should be incentivized directly to take up the use of technologies that could be clearly linked to improved health outcomes, in part through greater self-care and behavior change. For example, a patient who regularly entered his or her blood glucose levels on an app could receive a small bonus payment—perhaps even via a mobile payment mechanism such as Venmo – once a week’s worth of that activity were completed. Payers also could investigate using these types of incentives to enlist patients in primary prevention—e.g., incentivizing young and healthy patients to use fitness trackers or nutrition-oriented apps to maintain good eating and exercise habits and maintain healthy weights. Value-based insurance design models also should be tested, in both commercial insurance and Medicare Advantage plans, as a way to incentivize consumers to choose lower cost providers and modes of care, including telehealth.
15. Rigorous efforts should be made to compile evidence on new technologies and the payment models that support their adoption and the move to more distributed forms of care. Public and private payers should significantly increase research funding for health technology assessments on the uses of telemedicine and distributed forms of care. Returns on investments in technology also should be assessed in a disciplined and systematic way. Such

assessments should be part of pilot tests of new technologies in the context of new payment models created by both public and private payers.

16. To ensure value, sets of measures should be developed by the National Quality Forum and other entities to assist in tying payment to outcomes that matter to patients, and for particular use in payment models designed to stimulate the move of care to more distributed settings.



End Notes, Chapter 2

¹ “Medicare Advantage Value-Based Insurance Design Model”, CMS.gov, accessed May 7, 2018, <https://innovation.cms.gov/initiatives/vbid/>.

REGULATION & HEALTH CARE WITHOUT WALLS: CHAPTER 3 IN BRIEF

1. U.S. health care is a highly regulated enterprise at the federal, state, and even local level—the paramount reasons for which are the need to ensure a high level of health care quality and safety for consumers and patients, and protection against fraud. As a result, multiple regulatory issues at the federal, state, and local level will pertain to the movement of health care to more distributed settings, thanks to the vast array of regulations that govern the range of personnel who provide health care and who will be using technology; the places and settings in which technology-enabled care is provided; the technology-driven aspects of care that are provided; and technological equipment itself.
2. As health care evolves, well-intended regulations written for one era of health care pose uncertainties for technology-driven innovations that arise in another era. An example are hospital-at-home programs that are neither, strictly speaking, hospital care or home care, but may be subject to licensure requirements in states that apply differently to those activities. What's more, because much of health care now depends on exchanges of digital information, specific areas of regulation not unique to health care, but more generally applicable to information in general, now play an important role. Differences in regulation among countries also affect health care, such as new European Union information privacy and security standards.
3. A further complexity is that, in US health care, regulation is often very closely tied to payment. This particular duality—regulation tied to payment—creates special problems in the context of virtual care that is cutting across older care, reimbursement, and regulatory silos.

4. Taking into account the vision developed by the Technology Work Stream as to what the delivery of health care could look like in 2025, the Regulatory Work Stream of the Health Care Without Walls Initiative considered such topics as governmental approval of digital health products and devices; regulations governing privacy, security, and health information retention; and health professional licensure and scope of practice, among others. Its overall goal was to articulate a regulatory framework at the federal and state levels that would support evolution of a more distributed care system, and deliver the benefits of a more accessible, timely, convenient, and lower cost health care system while preserving or advancing quality and safety.
5. Recommendations of the Regulatory Work Stream extended across many different and evolving areas. In general, the work stream recommended, new frameworks, models, and pathways are needed, or “islands of innovation” created, so that these new models of regulation can evolve and support the flourishing of more distributed health care systems. These regulatory models can and should be more focused on outcomes for patients, and not so much on the conventional silos and “boxes”—such as those related to specific types of health care facilities—into which health care and attendant regulations have traditionally been packaged. An example would be enhancing the authority of the Center for Medicare and Medicaid Innovation (CMMI) to experiment with new virtual care delivery and payment models that could also require regulatory safe harbors, such as under the Stark Law, to permit health systems to provide useful technologies to providers.
6. The federal government should address certain regulatory obstacles to telemedicine, such as the Drug Enforcement Administration regulations on prescribing of controlled substances described above. The DEA should move forward with its announced plan to adopt a single national telemedicine registration that would allow a prescriber to prescribe controlled substances via telemedicine anywhere in the nation.
7. As discussed at greater length in the Work Force Work Stream recommendations, states should enact model statutes that expand the scope of practice for multiple types of health professionals, including advanced practice nurses, to make maximum and flexible use of the health care labor force in the delivery of more distributed care. Through certification programs and possibly licensure, states should expand use of community health workers, as recommended in the Work Force chapter of this report. The federal government should either develop a parallel system of national

licensure of health care professionals, or create a quasi-public entity that to enact new national licensure provisions, to allow for voluntary licensure at this level for health care professionals. States could be incentivized, but not required, to adopt the new national or federal licensure standards as their own, or to cease state-based licensure and agree to let the national licensure system govern in their state. Failing that approach, “innovation pacts” should be struck between and among states that have a common interest in creating greater fluidity of care—for example, in states that are parties to the movement of so-called “snowbirds,” who may move between the north and south during the year in pursuit of good weather.

8. To address health information privacy and security, Congress should address the complex array of federal, state, constitutional, statutory, and regulatory provisions that apply in the U.S., and do the following:
 - Create one health care federal privacy and security regulator and one overarching set of health and health care privacy and security regulations along the lines of the European Union’s General Data Privacy Regulation (GDPR), as discussed above.
 - If the creation of one health care privacy and security regulator is impossible in the U.S. context, all companies producing devices or other entities that utilize or transmit health-related data and information should adopt a code of conduct around both health and health care data privacy and security and a self-regulatory obligation to meet standards and requirements of the FDA, the FTC, and other relevant federal and state regulatory agencies.
9. Autonomous cars may eventually play a major role in the delivery of health care, but federal and, to a large degree, state regulation of them is virtually nonexistent at the moment. Cooperative groups among government, industry, and representatives of the public should be empaneled to study what safety and other issues will arise and consider appropriate options for self-regulation or public sector regulation.
10. On device regulation by the FDA and the agency’s pre-certification program, the FDA should continue to provide guidance as technology evolves on which devices it will regulate and which it will not. The pre-certification program should be closely studied and expanded to other companies over time,

particularly as those companies sign onto the industry-wide code of conduct on privacy and security as set forth above.

11. Access to high speed broadband is vital in today's society and economy, especially for the purposes of advancing public health and enabling a state-of-the art health care sector. It is unconscionable that much of the U.S. population lacks access to affordable high-speed broadband. Amid signs that a major national infrastructure investment plan is unlikely to be forthcoming in the short term, Congress should enact multiple approaches to extend high speed broadband service to underserved areas; these could include grants and loans to towns or rural cooperatives; tax credits to incentivize private companies to expand into underserved areas; and "reverse auctions," in which internet service providers would "bid" competitively to draw on public funds.

12. Amid uncertainties about whether the repeal of net neutrality provisions will increase or lower costs of data transmission over the internet, or advantage or disadvantage certain types of users, Congress should require the Federal Communications Commission and the Federal Trade Commission to jointly conduct annual studies of the effects of repeal on pricing and data transmission, including comparisons among states that have or have not acted to preserve net neutrality. If signs emerge that costs are rising excessively for certain types of users—whether they are groups of individuals, companies, or economic sectors—or that they are being "steered" into slower lanes of transmission in a way that results in deleterious effects, particularly on health care and public health, Congress should act to restore net neutrality as a national requirement.



THE WORK FORCE TO SUPPORT HEALTH CARE WITHOUT WALLS: CHAPTER 4 IN BRIEF

1. NEHI's vision for health care in 2025 is that health care will increasingly be accessed and delivered "without walls." Patients will receive more care than they do now in their homes, schools, and other community-based venues and "distributed" settings out of conventional health care settings, such as hospitals and physicians' offices. It will be possible to provide many forms of health care across state, regional, and even national borders. Vast amounts of data will be turned into actionable information to assist clinical decision-making; care will be delivered far more often than at present by multidisciplinary teams of providers, whose clinical competencies will be accompanied by new skill sets that facilitate application of technology and informatics in routine patient care; and these multidisciplinary teams will also address the social and economic determinants of health that often drive illness and care needs.
2. All of these changes will have a profound impact on the health care work force—the people who will be delivering care to patients in these ways. As these more distributed forms of health care evolve, the roles of almost all types of health care professionals are likely to change substantially, and it will be critical to have the health care work force be as flexible and adaptable as possible to accommodate the changes. New capabilities and practices will have to be created to provide excellent health care in more distributed settings; more types of workers, such as community health workers, may be needed, and the tasks performed by current types of workers, in terms of what they do and how they do it, will change.

3. A health care work force that fully utilized technology could markedly increase access to care, especially in underserved areas. However, because labor represents such a large cost component of health care, keeping that care affordable will demand making the most efficient use possible of labor through increased productivity, not simply having more bodies equipped with more technology to provide it. Advancing technology may provide opportunities both to supplant some types of labor, as well as to augment the decision-making skills of health professionals to such a degree that “task shifting” of labor from higher-skilled to less-skilled workers may also become a reality. To make such task shifting possible, it will be increasingly important to have all health professionals, and particularly non-physician health care professionals, trained, certified, and empowered to practice at the top of their licenses.
4. The Work Force work stream of the Health Care Without Walls Initiative articulated a vision for a qualified work force capable of meeting the health and health care needs of Americans, and that advances the health of Americans, not just the care. It sought to describe what types of education and training would prepare the future work force to provide safe, efficacious, efficient, accessible, cost-effective, and culturally appropriate care in distributed settings. It also considered ways to increase the rewarding aspects of working in the health care sector and minimizing frustration and burnout.
5. The Work Force work stream reviewed many different projections of the types of health care workers that will be needed in the future, and found that none of them incorporated any assumptions about how increased use of various technologies would affect either the supply of or demand for such workers. As noted throughout this report, advances in technology, changes in scope of practice, and expanded application of artificial intelligence and other information technologies into the health care sector will undoubtedly result in reduced work force needs in some fields or occupations, and increased demand in others. Because most existing projections do not take such factors into account, they are deeply flawed, and don’t serve as a useful guide to planning for the future work force. New methodologies should be developed that begin to take various assumptions about the use of technologies, such as artificial intelligence, into account.
6. To ensure the greatest productivity, flexibility, and adaptability of labor in the health care sector, and to make the best use of the nation’s investment

in training health care professionals, substantial changes are needed in licensure. regulation. As set forth in the Regulatory chapter of this volume, states should be encouraged or incentivized to join physician, nurse, and other health professions licensure compacts to facilitate multistate licensure to facilitate interstate provision of care. The federal government should take on a more prominent role in this process by offering incentives to states to join these compacts by a certain date, and by imposing penalties if states do not do so. Concurrently, the federal government could also begin developing and implementing a parallel process aimed at creating a national licensure construct that states could opt into voluntarily if desired. There is also a need to develop and enact model legislation within states on scope of practice that aims to facilitate health care providers' ability to practice at the top of their licenses.

7. Although the current health care work force contains a talented pool of workers with tremendous potential to meet the needs of a more technology-enabled, distributed health care system, many of these workers do not have adequate training and skills for this purpose. Many changes will thus need to occur in education and training of health care workers. What's more, given the long pipeline for the education and training of health professionals as well as faculty and students, numerous decisions will need to be made soon despite uncertainties about the future.
8. The federal government, states, and institutions and organizations involved in higher education and training of health professionals should define new competencies that some or all types of health care workers should have in the future to deliver more virtual care. They should also attempt to define new categories of workers who will be needed, or to define how existing categories of workers should evolve to meet a changing health care environment.
9. Institutions and organizations will need to overhaul existing degree-granting programs to reflect advances in technology and new models of care. They will need to increase integration of technology and informatics into curricula, and improve how the use of technology is taught, with a focus on setting targets for the development of skills and competencies appropriate for different types of health professionals. Degree-granting programs must provide workers with instruction in areas such as health informatics, virtual health care, team-based care, and working in collaboration with community-based organizations. They will need to create new certification and degree

programs for new types of health care workers, such as community health workers or virtual specialists and technicians. Institutions and organizations also should increase their emphasis on inter-professional education that teaches team-based care.

10. Faculty members at many institutions that provide higher education of health professionals are often far removed from clinical practice. These institutions, and their umbrella organizations, will need to provide opportunities for faculty development in technology use and instruction within teaching institutions.
11. Institutions and organizations will need to provide more practical opportunities for continuing education for health care professionals, to allow them to obtain the necessary skills to deliver more virtual, team-based care, and to function effectively in a rapidly-changing health care environment. Expanded online continuing education should be a priority. Institutions and organizations also should emphasize “stackable” credentials in virtual care delivery: e.g., certificates that can be obtained for training to be added on top of an existing degree.
12. Robust evidence should be the foundation for informed decision-making concerning the future health care work force, but there are multiple gaps in the current body of research. The federal and state governments, as well as private institutions, should fund the design and implementation of studies to examine work force inputs, practices, patient attitudes and outcomes, and other factors in evolving virtual models, and to compare these factors to traditional models of care. Research is also needed to understand how different types of workers will be affected by ongoing technological and system-level changes, with findings ultimately incorporated into more meaningful work force projections.



HUMAN FACTORS IN DESIGNING HEALTH CARE WITHOUT WALLS: CHAPTER 5 IN BRIEF

1. The profound changes that are occurring in how health care services and supports are delivered, with care moving out of conventional health care settings thanks to technologies such as telehealth and remote monitoring, will cause further sweeping changes in the ways that individuals and health care professionals engage with each other—not just for given care episodes, but over their lifetimes. Some technologies will also be used to displace humans and actually provide care to patients—for example, by robots. Health-related technologies may also surround humans in their everyday environments—for example, to monitor individuals’ biometric data; and feed the information back into patients’ electronic health records or applications.
2. As Health Care Without Walls unfolds, it is critical that attention be paid not just to the technologies themselves, but to the human factors that will determine how successfully and to what extent these technologies are integrated into health care. The field of human factors is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and with applying what is known about humans’ behavior, abilities, limitations, and other characteristics to the design of systems, activities, environments, and equipment or technologies. Human factors, for example, might be invoked to understand why people will react differently to a robot that features a human-like face versus one that resembles a mere machine.
3. The Human Factors Work Stream of the Health Care Without Walls initiative thus sought to delineate the relevant issues that technology developers,

health systems, educational and training systems and others should address in order to facilitate the evolution of a patient-centric, distributed health care system. It also recommended changes in public policy, and within health systems and other organizations, to support the 2025 Health Care Without Walls vision.

4. The work stream concluded that emerging technologies used in health care must be considered as part of the broader “sociotechnical” system, in which technologies interact with the social and physical realities of the world and with people’s beliefs and abilities. Understanding the sociotechnical system requires a multidisciplinary view, using approaches including human factors and ergonomics, behavioral economics, sociology, psychology, and human-centered design. Exploring new technologies through this broad, multidisciplinary perspective is essential in order to fully understand the promises and pitfalls of a new world of “Health Care Without Walls.”
5. Such a multidisciplinary perspective suggests that, if new technologies are to be used effectively in health care, they should be based on a number of core principles. Among them: Technologies should be created through human-centered design—a process that starts with people and ends with solutions tailored to suit their needs. Technologies should be easy to use and “frictionless” for different types of users with different abilities, and seamlessly integrated into their lives so that they become an almost invisible part of the health care journey. Technologies should be predicated on the seamless ability to exchange data within appropriate security and privacy safeguards; to allow data to follow patients; and to present data in such a way that they are clearly understood and actionable for users. They should not only be safe when used correctly, but should also incorporate fail-safe mechanisms and backstops that will prevent injury or death in the event that they are not used correctly.
6. The core principles described above should be incorporated into a set of voluntary standards that both developers and users of these technologies would endorse and abide by. To derive such standards, organizations such as the American Hospital Association, the American Medical Association, the American Nursing Association and others could join with a technology industry group, and with organizations such as the Human Factors and Ergonomics Society, to convene stakeholders and to frame standards.

7. Technology developers should take steps on their own to expand their consideration and application of human factors. For example, having a more diverse work force will best equip developers to produce technology that is more likely to be usable by, and attractive to, different types of users. A voluntary industry standard also should be adopted that requires involving patients in product design; or a voluntary system of ranking or a seal of “approval” created for technologies that are developed with usability and human factors in mind.
8. In the case of technologies that are subject to regulatory approvals, either by the Food and Drug Administration or other regulatory agencies, the regulatory system should employ some mix of carrot-and-stick approaches to encourage consideration of human factors in the development and adoption of technologies. In the “carrot” approach, the consideration of usability and human factors would be encouraged through the promise of faster or easier product approval for organizations participating in such programs. In a “stick” approach, regulators could enforce the consideration of usability and human factors issues through the regulatory process. For example, in the pre-certification program now being piloted by FDA, the involvement of end users in design of a product or technology should be a criterion of qualification for a company to participate. In general, carrots, or incentives, should be tried first, to be followed by sticks, or penalties, if these do not work.
9. Health care organizations should integrate human factors expertise into many facets of health care delivery, including virtual care, and should incorporate the input of human factors experts into such areas as provider education, simulation, quality improvement, evaluation of patient experience, and technology procurement. An example would be conducting “ride alongs,” in which someone acts as a patient in order to observe and document what the experience of using a particular technology is like for the patient. Health care organizations also should proactively engage with technology developers to create usable, useful, and safe technologies, and should not wait until technology developers come to them.
10. As health professions education and training is restructured to incorporate instruction in virtual care, it should require at least some amount of training in human factors and human-centered design, either as part of a degree curriculum or as continuing education.

11. Multiple knowledge gaps exist, and both the public and private sectors should invest in research that will shed light on human factors considerations as Health Care Without Walls evolves. Especially important will be identifying key features of technologies that make them generally more useful, and safer, and more likely to be adopted by health care providers and patients alike. Other key questions include whether use of more virtual technologies in health care will exacerbate isolation, or mitigate it; what features of new technologies have the greatest potential to help providers better serve their patients, lighten their workload, and minimize clinician “burnout;” and what if any are appropriate limits on the use of virtual technologies in health care, such as in discussions about end-of-life care. Some of these topics may not just amount to research questions, but also ethical ones to be explored.

