NEJM Catalyst

COMMENTARY

Value-Based Health Care at an Inflection Point: A Global Agenda for the Next Decade

Stefan Larsson, MD, PhD, Jennifer Clawson, MBA, Robert Howard,
DOI: 10.1056/CAT.22.0332

A growing number of health care organizations around the world are using the systematic measurement of health outcomes that matter to patients — and the costs required to deliver those outcomes — as a catalyst for innovation and continuous improvement. Under the rubric of value-based health care, this movement is transforming how providers deliver care and assess their performance, how payers design payment models, how pharma and med-tech companies create new business models, and how clinical researchers conduct clinical trials. This article makes the case that the movement to improve health care value is at a critical inflection point. The key challenge — and opportunity — for the next decade is to use the principles of value-based health care, developed and proven at pioneering organizations around the world, to transform entire regional and national health systems. This article describes a framework for understanding value-based health care as an organizing principle for health system transformation and proposes a "moonshot" agenda for governments, in cooperation with industry stakeholders, to create the value-based health systems of the future.

In the 17 years since Michael Porter and Elizabeth Teisberg first coined the term,[1] value-based health care has evolved from interesting concept to emerging practice to international movement. In the decade to come, it needs to become the organizing principle not just for individual health care organizations, but for national health systems and for the global health care sector as a whole.

Porter and Teisberg argued that, seen from the patient's perspective, the ultimate measure of performance in health care ought to be the delivery of health outcomes that matter to patients

for a given cost along the full cycle of care. Since the publication of their pioneering 2006 book *Redefining Health Care: Creating Value-Based Competition on Results*, and in response to persistent performance problems in the health care sector, a growing number of providers around the world have been measuring and tracking patient health outcomes and the costs required to deliver them — and then using the data to identify best practices and redesign care pathways to deliver improved results to patients. Payers are introducing value-based payment models to create incentives for value-based care. Some pharma and med-tech companies are exploring new value-based business models. And researchers are using outcomes data from routine care to do comparative clinical research.

Today, this movement is at a critical inflection point. Value-based health care is fast becoming a project not only for improving the performance of individual health care organizations, but also for transforming how entire health systems operate and are managed. In at least some countries, politicians and policy makers are working with industry stakeholders to reorient regional and national health systems around value-based health care.

The coronavirus pandemic is accelerating this transition. The pandemic has shed a harsh light on a set of persistent challenges confronting health systems around the world, exposing their underlying fragility and revealing critical structural weaknesses such as major gaps in health data; serious underinvestment in public health, prevention, and the treatment of chronic disease; and massive inequalities in health outcomes across nations and social, racial, and demographic groups.[2] At the same time, the sense of urgency created by the pandemic has been an extraordinary catalyst for value-based innovation.[3] In the face of crisis, clinicians, researchers, private corporations, government regulators, and patients adapted quickly to mobilize around a shared goal. Epidemiologists systematically tracked cases and deaths on a global basis and shared their findings with the public. Providers reached out to help and learn from each other and shifted nearly overnight to incorporate effective new practices such as telemedicine. Pharmaceutical companies and regulatory agencies developed, tested, and approved vaccines in record time.

In the process, the pandemic has made urgently clear the importance of more agile and more coordinated approaches to managing patient care and the global health care sector as a whole — not just when it comes to new infectious diseases, but for all diseases and conditions. There is a growing understanding that sustaining the innovations of the pandemic period will require broad systemic changes in how health systems operate.[4]

For all these reasons, we believe that initiatives to create genuinely value-based health systems should be the primary focus of the value-based health care movement in the coming decade. A holistic, systemwide approach is necessary because the efforts of any single organization to improve value delivered to patients will only be sustainable in the long term if all stakeholders in the industry align their efforts around this shared goal and if the various components of national health systems — payment models, government regulations, digital infrastructure, and the like — are designed explicitly to support value-based approaches to care. The challenge of the next decade will be to scale up the many promising local initiatives to achieve large-scale systemwide change.

In this article, we propose a framework for understanding value-based health care as an organizing principle for health system transformation and call for a public-private "moonshot"[5] in which governments, in cooperation with industry stakeholders, invest in the value-based transformation of national health systems. The goal of such an initiative would be to develop coordinated public policies, regulations, and shared infrastructure to encourage multi-stakeholder cooperation and value-based innovation across all sectors of the global health care industry and to support the emergence of dynamic provider ecosystems that deliver high-value care.

In particular, the moonshot should focus on three especially critical tasks: (1) institutionalize the systematic collection and sharing of comprehensive data on health outcomes that matter to patients, ideally on a global scale; (2) align the many current initiatives in the domain of value-based payment with the continuous improvement in the health outcomes delivered to patients; and (3) invest in the creation of digital standards and open platforms that will transform the health sector into a genuine learning system.

We acknowledge that this is a visionary agenda. But the fact is, each of these steps is already happening in some form in countries around the world. The challenge for the future: government policy makers and health care leaders need to take collective action to accelerate these emerging trends.

A Systems Framework for Value-Based Health Care

There are widespread differences around the world in how health systems are financed, organized, and managed.[6] Despite these differences, all health systems, to one degree or another, confront three systemic crises, as described below. Addressing these crises effectively requires a systemwide response.

A Crisis of Value

The core crisis is a crisis of *value*, characterized by unsustainable growth in costs, substantial waste, and a growing disconnect between money spent and the health outcomes delivered to patients. Based on data from the Organisation for Economic Co-operation and Development (OECD), we estimate that health care costs, as a percentage of GDP, across 36 OECD member countries grew from 9% in 2000 to 12% in 2019.[7,8] The United States, of course, is an extreme outlier, spending nearly 20% of GDP on health care, roughly double the percentage of other developed countries. But costs are rising in countries all over the world. Even worse, in recent years, it has become increasingly clear that a significant portion of this spending — estimates suggest anywhere from 20% to 40% depending on the country[9] — is, quite simply, wasted on low-value and, in many cases, medically inappropriate care.[10-12]

The key symptom of this value crisis is the stubborn persistence of broad variations in the health outcomes delivered to patients across countries and across regions within countries,[13] between different socioeconomic and racial groups,[14] and even between different hospitals and clinical sites treating the same types of patients[15] — often with no clear correlation between money spent and health outcomes delivered. Again, the United States is an outlier, spending more per capita

than other developed countries but delivering significantly lower health-adjusted life expectancy[16] and poorer health outcomes in key areas such as infant and maternal mortality.[17] Although there are many reasons for this widespread variation in health outcomes, ever since the pioneering research of Dr. John E. Wennberg and the Dartmouth Atlas of Health Care Project, it has become increasingly clear that a significant portion is driven by unwarranted or medically inappropriate variations in clinical practice across hospitals and other clinical sites.[18]

A Crisis of Evidence

The value crisis is made worse by a parallel crisis of *evidence*, characterized by a growing disconnect between research and clinical practice. The evidence crisis is a paradoxical product of the explosion of biomedical knowledge in recent decades and the resulting proliferation of new diagnostic and therapeutic tools. Clinicians, with ever-greater access to patient data as well as more diagnostic and therapeutic options from which to choose, risk being paralyzed by information overload. Without adequate decision-support tools, it becomes a major challenge for them to know how to apply new knowledge or how to match the most appropriate treatment to the circumstances of a given patient.

> *"The key symptom of this value crisis is the stubborn persistence of broad variations in the health outcomes delivered to patients across countries and across regions within countries, between different socioeconomic and racial groups, and even between different hospitals and clinical sites treating the same types of patients."*

Despite the embrace in recent decades of evidence-based medicine and the proliferation of clinical guidelines as standards of care, the fact is that scientific evidence just does not yet exist for the effectiveness of many clinical interventions[19,20] and the evidence that does exist is often surprisingly weak.[21] Moreover, the roughly $400 billion that the global health care sector spends on research and development every year is not solving the evidence crisis — for the simple reason that remarkably little of that money is invested in analyzing the comparative effectiveness of different treatments or therapies.[22] For example, using data on all clinical trials from Phase II and later that are registered at the U.S. government website ClinicalTrials.gov,[23] the most comprehensive global database of active clinical trials, we estimate that only 3% of pharmaceutical industry–sponsored clinical trials evaluate more than one product and are sponsored by more than one company, a finding that is in line with reports in the peer-reviewed literature.[24,25] Even when clinical guidelines are scientifically validated, the widespread adoption of guidelines is so slow[26] and medical knowledge is moving so rapidly that guidelines tend to have a relatively short shelf life, and, by the time they are finally implemented, may be out of date.[27,28]

A Crisis of Purpose

Both the value crisis and the evidence crisis contribute to a third crisis, one that is simultaneously more subtle and yet perhaps even more corrosive. We call it a crisis of *purpose,* and it concerns the growing disconnect between the values that draw people to work in the health care sector and the

reality of their experience working in it. For years, there has been considerable discussion of the extremely high rates of stress and burnout in the health professions.[29,30] The pandemic has only made the problem worse.[31,32] But we believe that stress and burnout are merely symptoms of a deeper trend: the growing complexity of the global health care sector. In addition to the expanding clinical complexity due to rapid advances in biomedical science and the proliferation of new tools for diagnosis and treatment, there is growing task complexity characterized by increased specialization and the concomitant fragmentation of care as well as by the steady proliferation of new performance requirements (providing quality care, controlling costs, maximizing capacity utilization, minimizing wait times, ensuring patient satisfaction, etc.). In effect, health care has become a classic example of what system scientists term a "complex adaptive system."[33-35]

The roots of the purpose crisis lie in how health care organizations typically respond to this complexity. Much like managers in other industries, health care leaders have established a plethora of standardized processes, structures, guidelines, and key performance indicators in an understandable but misguided attempt to manage and control complexity and the costs associated with it. This focus on compliance often comes at the price of eroding the professional autonomy of clinicians while at the same time making it more difficult for them to work together across organizational units and specialties to make the trade-offs that are necessary to deliver value to patients. The paradoxical result: unnecessary layers of organizational complicatedness on top of necessarily complex tasks.

> *"Despite the embrace in recent decades of evidence-based medicine and the proliferation of clinical guidelines as standards of care, the fact is that scientific evidence just does not yet exist for the effectiveness of many clinical interventions and the evidence that does exist is often surprisingly weak."*

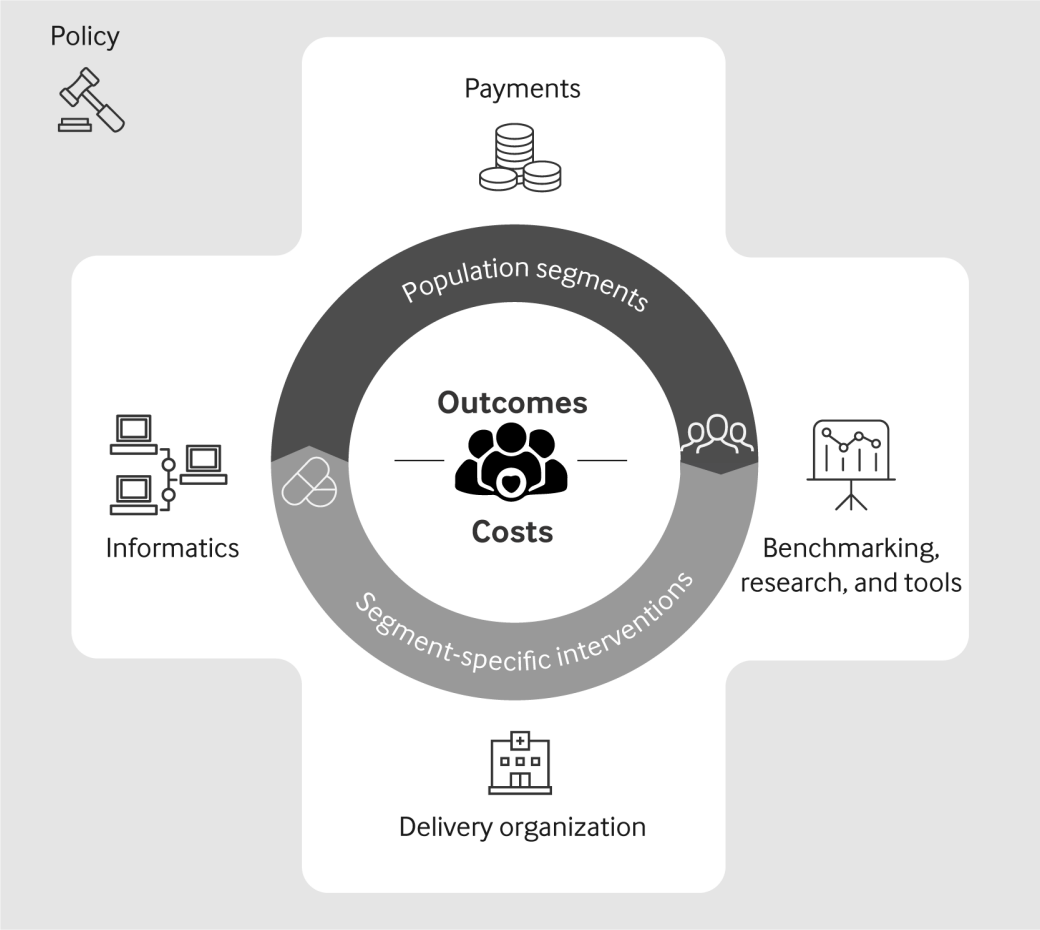
The complexity of modern medicine and the modern health care industry isn't going away. The way to effectively manage a complex adaptive system, however, is not by creating ever more complicated management systems. Rather, all stakeholders must work together to define a limited but comprehensive set of principles — what system scientists call "simple rules"[36] — to reshape the organizational context so that it encourages innovation and value-enhancing behaviors while also ensuring that the system evolves in a desirable direction.

The literature on complex adaptive systems suggests that four types of rules are especially important: (1) a *clearly articulated purpose* around which stakeholders can align, (2) access to*data and information* directly relevant to that purpose to inform stakeholders' actions and interactions with each other, (3)*resources and incentives* aligned with the purpose to make it easy for the right kind of behaviors to emerge, and (4)*regulations and other governance mechanisms* that encourage autonomy, innovation, and self-organization, while protecting against self-dealing and abuse.

Figure 1 applies these simple rules to health care and describes a unifying framework that we developed in collaboration with the World Economic Forum for addressing the three crises described above in a holistic and coordinated way.

FIGURE 1

A Conceptual Framework for a Value-Based Health System



Source: World Economic Forum

The foundational principle of value-based health care is that the purpose of any health care system should be to deliver the best possible health outcomes to patients for the money spent. This goal puts the individual patient at the very center of the health system and reconnects clinicians and other health professionals to the sense of purpose that attracted many of them to the industry in the first place. Put another way, in a value-based health system, patient value becomes what evolutionary biologists call the "selection principle" against which the contribution and performance of all institutions in the system, as well as the effectiveness of health-system reform initiatives, are assessed and evaluated.

The systematic measurement of health outcomes that matter to patients, as well as of the costs required to deliver those outcomes across the full cycle of care, provides the critical data that industry participants need to fulfill the mission of continuously improving patient value. The relevant outcomes tracked for any individual patient depend on their profile matching to a specific population segment (for example, all patients suffering from a specific disease or groups that share a similar risk profile). Tracking standardized outcomes by population segment makes it possible to compare clinical units, identify clinical best practices and generate the evidence needed for better clinical guidelines, reduce outcome variation and practice variation across providers, eliminate waste, and customize care delivery for defined patient segments.

Four system supports or enablers constitute the essential resources and incentives for reorienting health systems around patient value. The first is the development of a dynamic provider ecosystem, characterized by new organizational models and roles (captured in the framework by the term "delivery organization") that allow networks of providers and suppliers to deliver better access to appropriate care, engage clinicians in continuous improvement, and adapt to new opportunities and innovations. Another key enabler of value-based health care is the design of value-based payment models that create incentives for continuous improvement in patient value by encouraging behaviors such as a focus on prevention and better cooperation along the care pathway.

> *"In a value-based health system, patient value becomes what evolutionary biologists call the 'selection principle' against which the contribution and performance of all institutions in the system, as well as the effectiveness of health-system reform initiatives, are assessed and evaluated."*

Two additional enablers are necessary to scale up health outcomes measurement and fully integrate it into clinical practice. Common digital standards and open digital platforms (captured in the framework by the term "informatics") need to be developed for the routine capture, sharing, and analysis of health outcomes and other relevant data across health systems. And new analytical tools for benchmarking and research are necessary for translating the rapidly accumulating quantities of standardized patient data into clinical guidelines for increasingly customized interventions, ever more precise care pathways, and, ultimately, advanced decision-support tools to inform clinical practice and improve value for defined patient segments over time.

Finally, a value-based health system also requires the development of an important governance and regulatory context: new public policies and legal and regulatory frameworks that, through the design of a limited set of enabling guardrails, encourage value-based innovation across all the components of the health system and accelerate the transition to value-based health care.

When one looks back on the past decade through the lens of this framework, two observations are immediately apparent. On the one hand, a great deal of innovation and progress has taken place across every dimension of the model.

For example, in the core domain of health outcomes measurement, the nonprofit International Consortium for Health Outcomes Measurement (ICHOM),[37] founded in 2012, has recruited roughly 1,000 clinical experts and patient representatives from >60 nations to develop and publish standardized outcome metrics and risk-adjustment variables for >40 major conditions and population segments representing nearly 60% of the global disease burden. Currently, ICHOM outcome standards are used in some form in approximately 500 hospitals, other clinical sites, and quality registries in >40 countries.

Institutions around the world, in both high- and low-income countries, are using such measures to identify best practices, reduce outcomes variation, improve quality, and develop new models of integrated care delivery in a variety of disease domains, including prostate cancer,[38-40] breast cancer,[41,42] type 1 diabetes,[43] cataract surgery,[44,45] primary care for medically underserved populations,[46,47] and maternal and newborn health[48] — just to name a few.

Payers in countries such as Denmark, Estonia, the Netherlands, New Zealand, Portugal, Singapore, Spain, Sweden, Switzerland, the U.K., and the U.S., are experimenting with value-based payment models such as pay-for-performance bonuses, bundled payments, and capitation and other forms of risk-based contracting for specific population segments.[49,50]

Finally, clinical researchers at quality registries and biomedical research institutions are leveraging the exponential growth in the availability of health outcomes and other health-related data to conduct prospective, pragmatic, randomized clinical trials that evaluate the effectiveness of clinical interventions, allowing for real-time comparative research, more rapid updating of clinical guidelines, and more effective monitoring of compliance.[51,52] What's more, they are increasingly using advanced analytics based on machine learning and artificial intelligence (AI) to analyze large data sets on a global scale to increase diagnostic precision (for example, by helping clinicians distinguish between high- and low-risk patients for a given condition[53]) or customize treatment (for example, by developing predictive models for post-treatment health outcomes[54]).

On the other hand, it is fair to say that while progress has been considerable, it has also been fragmented and uneven across countries and medical conditions and in the degree of engagement of various stakeholders in the health care sector. No country has all the elements of our model in place. Even those countries that are leaders in certain domains are also laggards in others.

> *"In 2018, the Dutch government announced a 5-year Plan for Outcome-Based Healthcare as a first step in developing a national strategy for the value-based transformation of the Dutch health system."*

For example, Sweden has the world's most extensive network of >100 quality registries, some dating back to the 1970s, which has made the country a leader in the use of systematic outcomes measurement to improve health outcomes.[55] But after some initial promising experiments in value-based payment, more recently the Swedish health system has pulled back from payment-model

innovation. In contrast, the U.S. has been an active site of experimentation and innovation in value-based payment and risk-based contracting.[56,57] But the fragmentation of the U.S. health system and the general reluctance of providers and some medical specialties to collect and share outcomes data with peers and the public has meant that the U.S. lags other countries in the development of a truly comprehensive national infrastructure for health outcomes measurement. And despite the rapid evolution of digital health, it remains the case that the health care industry as a whole lags behind other industries such as finance or retail in the development of powerful digital applications founded on AI, predictive analytics, and big data. In particular, the lack of agreed-upon metrics and comprehensive standards for what technologists call interoperability (the capacity to easily share and link data from a variety of sources) has so far limited our ability to leverage such techniques to fundamentally improve clinical decision-making.

To build on the progress that has taken place, but also to address the remaining obstacles, the global movement for value-based health care needs a more strategic and coordinated approach. In particular, it needs to put more focused attention on the all-important public-policy context that crucially shapes all the other components of the value-based health system. This is the purpose of our moonshot.

A Moonshot for Value-Based Transformation

As the primary (and in many countries, the sole) payer for health care services, the chief regulator in what is, by necessity, a highly regulated industry, and the mediator among the many stakeholders and interest groups in the industry, government needs to play a leadership role in the value-based transformation of the world's health systems. The world's governments need to create new rules that realign the goals of industry stakeholders around improving the health outcomes delivered to their citizens and start assessing the performance of national health systems based on the actual results delivered to patients. A government moonshot would accelerate the value-based transformation of the world's health systems by defining a clear mission and strategy, shaping health care markets to encourage value-based innovation, and placing some targeted game-changing bets in terms of public investment.

Some governments are already taking steps in this direction. Consider the following three examples.

The Netherlands

In 2018, the Dutch government announced a 5-year Plan for Outcome-Based Healthcare as a first step in developing a national strategy for the value-based transformation of the Dutch health system.[58] The program supports four main goals:

1. To reach a consensus among key stakeholders on the outcomes to be measured for conditions representing at least 50% of the total disease burden

2. To use outcomes data to support shared decision-making on treatment choices between providers and patients

3. To promote the outcome-based reorganization of care delivery and reimbursement through development of more integrated care chains and the encouragement of more outcome-based contracts between insurers and providers

4. To facilitate better access to up-to-date outcome information through the development of a state-of-the-art health informatics infrastructure

Although the coronavirus pandemic has delayed the achievement of these goals and has led to the extension of the original 2018–2022 time frame through 2023, national outcome measures are being defined for major conditions and, once they are tested and validated in the field, new legislation will mandate that all Dutch health care providers measure and publicly report the health outcomes that they deliver to patients.

Singapore

Another country pursuing a comprehensive value-based strategy is Singapore, which has the second-highest health-adjusted life expectancy in the world (second only to Japan), even as it spends only about 40% per capita on health care that the United States does.[59] In 2016, the Ministry of Health announced a strategy for the national health system known colloquially as the "Three Beyonds": beyond health care to health, beyond hospital to community, and beyond quality to value.

> *"A broad emphasis on improving population health and well-being has led Singapore to invest significantly in screening, health promotion, and other preventive services."*

Singapore's strategy starts from a holistic perspective on the place of health care in the broader society and its role in encouraging human potential and national social and economic development. A broad emphasis on improving population health and well-being has led Singapore to invest significantly in screening, health promotion, and other preventive services. It has also led the government to think strategically about population segmentation, defining critical segments in terms of pivotal life stages when an intervention can have significant positive impact. Finally, the Singapore strategy embraces other critical mechanisms of value-based health care such as outcomes measurement and value-based payment. In September 2022, the Ministry of Health announced the latest iteration of its value-based strategy under the rubric "Healthier SG." Among other initiatives, the program proposes a major expansion in Singapore's primary care system and the transition from a traditional fee-for-service payment model to population-based capitated payments to create new incentives for prevention.[60]

Wales

In 2019, the government of Wales and National Health Service Wales published a 3-year action plan that focuses on three critical components of value-based transformation: systematic measurement of both clinical and patient-reported health outcomes, a national program to track activity-based

costing to support decision-making about resource allocation, and the development of a digital infrastructure for electronic communication between patients and providers with a goal of furthering digital inclusion and citizen engagement.[61]

Three Key Areas of Health System Transformation

Of course, the above examples are all from relatively small countries. To launch a genuine moonshot, more governments, including those from larger countries, need to commit to the value-based transformation of their national health systems and, in particular, to make significant investments in three key areas of health system transformation, as described below.

Institutionalizing Outcomes Measurement

First, governments need to institutionalize health outcomes measurement by treating patient health outcomes data as a critical component of health data infrastructure. A first step will be to integrate outcomes measurement into the standard approaches for quality assessment that are emerging in many national health systems around the world. This objective will be a significant change because, so far, in most countries, the vast majority of metrics used to assess provider quality do not really address the actual health outcomes delivered.[62,63]

In the long term, however, we think that governments and public regulatory agencies should mandate comprehensive outcomes measurement and reporting for all health care institutions. Required reporting of standardized health outcomes data should be the equivalent in the health care sector of the routine financial disclosures that all public companies are required to make to financial regulatory authorities.

> *"Governments need to institutionalize health outcomes measurement by treating patient health outcomes data as a critical component of health data infrastructure."*

Such a reporting system would have multiple benefits. It would be a stimulus to organizational learning and continuous improvement. By making the measurement of outcomes, including those directly affecting the quality of life of patients, routinely transparent to the public, it would also arm consumers with the information they need to make informed choices among different providers and different treatment options. Finally, it would be a fundamental market-shaping intervention that would orient competition in the industry around value delivered to patients, creating the right kind of selection pressure on providers and all other contributors in the system, promoting meaningful innovation, encouraging the development of value-based provider ecosystems, and introducing a powerful stimulus to value-based transformation.

Second, governments should leverage their role as the primary (and often the sole) payer in the national health system to redefine payments to promote high-value care. Health care budgets and payment models need to steer investment to prevention and early intervention, encourage the development of fully integrated care pathways, and create incentives for informed patient choice of both providers and interventions.

Achieving these goals will require stronger linkages between new value-based payment models and systematic health outcomes measurement. Value-based health care is about delivering better health outcomes for the money spent; therefore, measuring and reporting health outcomes is a prerequisite for achieving sustainable value-based payment reform. The more that payers and providers can track metrics that reflect the actual health outcomes delivered to patients, the more effectively will they be able to link payment to the outcomes that really matter to patients and ensure that new payment models actually improve outcomes (or, at a minimum, do not erode them). Until payers start insisting that all institutions track outcome measures — and then assess the impact of specific value-based-payment models in terms of the actual health outcomes delivered — health systems run the risk that significant efforts to reorganize payment systems will not necessarily lead to significant improvements in patient value and, indeed, will be perceived by actors in the system as yet another cost-containment exercise in disguise.

This doesn't necessarily mean paying more to providers who deliver better outcomes. An alternative approach is simply to pay a bonus or other premium to providers who agree to make their outcomes data transparent — an approach that might be termed "pay-for-participation" rather than "pay-for-performance." For example, the French Ministry of Health and France's national payer recently launched a pilot at three leading centers for cataract surgery that uses the ICHOM cataract outcome-measurement set in a proof-of-concept demonstration project both for a future national cataract registry and for a standard model and methodology for health outcomes measurement in France.[64] Participating cataract surgeons receive an extra payment for each patient whose outcomes they share with the pilot project. Such a "transparency bonus" not only has the advantage of creating incentives for clinicians to collect and share data, but also communicates that payers consider outcomes measurement to be real work and an essential part of clinical best practice.

As part of a new incentive system that emphasizes prevention and continuous improvement in health outcomes, governments should also pursue a more integrated approach to health and social welfare budgeting and planning. Although there has been increasing emphasis on the centrality of social determinants of health to population health, too often, the budgets for interventions to address them stretch across multiple government agencies, creating obstacles to coordination, planning, and more rational resource allocation. The result is often systematic underinvestment in prevention and public health. In their role as the main financer of the health system, governments should strive to take a more holistic and integrated approach to budgeting for health care and social welfare.

Investing in a 21st-Century Digital Health Infrastructure

Finally, national health systems need a comprehensive agenda for creating the digital infrastructure that will harness next-generation digital technologies for systemwide organizational learning and the continuous improvement in the delivery of health outcomes that matter to patients. This will require necessary investments in three key areas: (1) better cybersecurity to protect patient data and privacy while enabling data sharing and analytics; (2) shared technical standards to ensure seamless interoperability among health information systems; and (3) new practices, rules, and regulations to integrate new technologies into clinical practice and to balance data privacy and data transparency.

> *"Creating global standards for a 21st-century digital health infrastructure is one area in which international cooperation could have a major payoff."*

By establishing robust standards for interoperability and cybersecurity, governments can facilitate the collection, sharing, and analysis of health outcomes data and the transparent reporting of health outcomes to the public. They can also jump-start a dynamic new innovation market in which health technology companies collaborate with clinical researchers, providers, and drug and med-tech companies to reinvent clinical research and trials and deliver better evidence for clinical guidelines.

The beginnings of such an approach can be seen in the recent evolution of the U.S. government's efforts to encourage the interoperability of health information systems. In 2009, the U.S. Congress passed the Health Information Technology for Economic and Clinical Health (HITECH) Act, which set aside $27 billion in incentives (the amount eventually increased to more than $35 billion) to support the adoption and "meaningful use" of electronic medical records (EMRs), a key step in building out a digital infrastructure for information exchange. But the EMR initiative focused primarily on digitizing existing patient records. As a result, the systems that were created had major issues of compatibility — across systems from different vendors and even across systems from the same vendor that had been customized for different institutions.

This began to change, however, in 2016, with the passage of the 21st Century Cures Act. The law stipulated not only that health institutions had permission to share health data, but also that they were *obliged* to do so and to share that data in the appropriate electronic form. In 2020, the federal government's Office of the National Coordinator for Health Information Technology (ONC), the principal federal entity charged with coordination of nationwide efforts to encourage and support the electronic exchange of health information, published the final rule outlining the key regulations for implementing that new legal requirement.[65]

The new rule defines enforcement mechanisms to prevent information blocking. For the first time in ONC's history, it also designates a specific data-sharing standard — the open-source Fast Healthcare Interoperability Resources or FHIR (pronounced "fire") standard — for the application programming interfaces (APIs) that all health IT developers must include in their systems and

applications so that they can communicate with each other. Finally, it establishes a common legal agreement and technical standards for health information networks to connect more easily with each other.

Creating global standards for a 21st-century digital health infrastructure is one area in which international cooperation could have a major payoff. By cooperating to create such standards to enable secure data collection, sharing, and analysis, governments can greatly accelerate current efforts at national and international benchmarking and research. What the health care industry needs is the equivalent of the effort to establish the TCP/IP networking standard, which laid the foundation for the modern Internet and in which key institutions in government, academia, and private industry worked together to create technical standards that had a transformative impact.

Achieving these goals — institutionalizing outcomes measurement, aligning payment to health outcomes improvement, and creating a 21st-century digital health infrastructure — will require considerable investment over an extended period of time. It will be easy for critics to argue that our moonshot agenda represents an impractical bridge too far in today's resource-starved health care environment. But now, more than ever, the value-based health care movement and the global health sector as a whole need to embrace strategic ambition.

> *"Now, more than ever, the value-based health care movement and the global health sector as a whole need to embrace strategic ambition."*

Consider the following thought experiment. Imagine if some of the major governments of the world were to agree to invest 1% of the amount they spend on health care every year in a value-based-health-care public investment fund. In the United States, which spends roughly $4 trillion annually on health care,[66] that would amount to approximately $40 billion per year, or $400 billion over a 10-year period. That may sound like a great deal of money, and, of course, it is. But the annual cost is only about 4% to 5% of the estimated $760 billion to $935 billion that the United States wastes every year on unnecessary or medically inappropriate care.[12] In other countries, the annual investment would be much less: approximately £2.6 billion per year ($2.9 billion) in the United Kingdom, €4.3 billion ($4.2 billion) in Germany, and ¥60 trillion ($4.1 billion) in Japan.

Such investments could be used to:

- Create national resource centers for patient-value improvement that would develop and validate standardized outcomes measures and establish national networks for conducting prospective randomized clinical trials using data from real-world health outcomes

- Accelerate the development and implementation of health-information technical standards by setting standards for cybersecurity to improve protection of patient data while enabling relevant data sharing, financing the development of current and next-generation interoperability standards, and creating a national data infrastructure for the distributed analysis of health data

- Define a regulatory framework and system of incentives for health system innovation, including a legal framework to regulate the use of patient health data, regulatory requirements for compliance with international cybersecurity and interoperability standards, new investments in comparative effectiveness research for new pharmaceutical and med-tech products, and national standards for value-based payment

Such an ambitious agenda would begin to reach genuine moonshot territory. It would also be of the order of magnitude necessary to build on the existing islands of innovation in health systems around the world and decisively reorient the trajectory of the entire health sector toward cost-effective high-value care.

In the United States, a potential important step in the right direction is the recent creation of the Advanced Research Projects Agency for Health (ARPA-H), proposed by the Biden administration and authorized by the U.S. Congress in March 2022. Modelled on the Defense Advanced Projects Research Agency (DARPA), the new agency's mission is "to make pivotal investments in breakthrough technologies and broadly applicable platforms, capabilities, resources, and solutions that have the potential to transform important areas of medicine and health for the benefit of all patients and that cannot readily be accomplished through traditional research or commercial activity."[67] Core ARPA-H priorities should include the design of the necessary data infrastructure and technology platform for a comprehensive U.S. health-outcomes measurement system and for the digital learning networks of the future.

Embracing "System Leadership"

The transition to value-based health care poses many challenges to health care leaders. These leaders need to develop strategies that will help their organizations succeed and thrive in an increasingly value-based world. They also need to lead the organizational transformation that will bring their people along to new ways of working and new organizational and clinical practices. But perhaps most important, they need to look beyond the interests of their own organizations to become stewards of value-based transformation in the health care sector as a whole. That is, they have to take collective responsibility to accelerate and manage the transition to a more sustainable value-based health system on which the success of their own institutions ultimately depends. We call this "system leadership."

> *"[Health care leaders] have to take collective responsibility to accelerate and manage the transition to a more sustainable value-based health system on which the success of their own institutions ultimately depends. We call this 'system leadership.'"*

System leadership takes a variety of forms. In some cases, institutions are partnering across sector boundaries to improve health outcomes at the regional or national level. One example is the network of 23 collaborative quality initiatives (CQIs) in the state of Michigan, probably the largest collection of multi-hospital quality-improvement programs in the United States.[68]

The program is a joint venture of the state's hospitals and Blue Cross Blue Shield of Michigan, the state's largest payer, which supports the centralized coordinating centers that lead the CQIs with more than $61 million in annual funding and has created a variety of financial incentives to encourage participation in the improvement initiatives. The program has been instrumental in institutionalizing innovations in care delivery in hospitals across the state.[69]

In other situations, organizations are working through their industry trade associations to accelerate the development of the critical enablers for a value-based health system. For example, MedTech Europe, a European trade association, has been instrumental in developing a value-based-purchasing framework for medical technologies.[70]

In still other cases, governments are taking the lead. The European Union has passed legislation authorizing a €2.4 billion Innovative Health Initiative (IHI), a public-private partnership that brings together the EU Commission and a network of industry stakeholders to facilitate innovation in areas of unmet health care need.[71] One focus of this initiative is the Health Outcomes Observatory (H2O), a collaboration between patients, clinicians, regulators, and the industry to develop a governance model for incorporating health outcomes, including patient-reported outcomes, into health care decision-making across Europe.[72]

The next frontier for this kind of multi-stakeholder collaboration to accelerate value-based health care will be to extend cooperation to the global level. Perhaps the most far-reaching initiative of system leadership at the global level to date has been under the auspices of the World Economic Forum and is known as the Global Coalition for Value in Healthcare.[73]

Established in 2019, the coalition is a public-private partnership that brings together leading chief executive officers, government ministers, and other health care leaders to advocate for the value-based transformation of the world's health systems. Since its founding, the Coalition has been identifying a series of global innovation hubs that are best-practice examples of value-based models of care and cataloguing best practices for the key system enablers of value-based health care. The plan is for these initiatives to become nodes in a global collaboration network that will accelerate the value-based transformation of the world's health systems by identifying and sharing best practices among its participants.

Playing an active leadership role in multi-stakeholder initiatives such as the Global Coalition for Value in Healthcare will become an increasingly important part of the responsibilities of health care leaders as the sector moves rapidly into its value-based future. No single institution can make value-based health care happen on its own. The deficiencies of global health systems are a systemic problem, and addressing them will require concerted collective action.

Stefan Larsson, MD, PhD
Co-founder, Chairman, and Interim President, International Consortium for Health Outcomes Measurement, Cambridge, Massachusetts, USA, and London, United Kingdom Senior Advisor, Boston Consulting Group, Stockholm, Sweden Distinguished Fellow in Health and Healthcare, World Economic Forum

Jennifer Clawson, MBA
Partner and Director, Boston Consulting Group, Madrid, Spain Global Head, Boston Consulting Group Center for Value in Health Care, Madrid, Spain

Robert Howard,
Author and Editor, Newton, Massachusetts, USA

Disclosures: Stefan Larsson is Co-founder, Chairman, and interim President of the International Consortium for Health Outcomes Measurement (ICHOM). He is Senior Advisor to Boston Consulting Group (BCG) and an independent advisor to health care organizations and board member of the life sciences companies Immedica and Symcel. Jennifer Clawson is a partner at BCG where she advises private- and public-sector organizations on the creation of new value-based business models and on strategic opportunities to improve health outcomes. Robert Howard was funded by BCG for the writing of this article. BCG has also provided pro-bono financial and in-kind support to ICHOM over the past decade.

References

1. Porter ME, Teisberg EO. Redefining Health Care: Creating Value-Based Competition on Results. Boston: Harvard Business Review Press, 2006.

2. COVID-19: Make It the Last Pandemic. The Independent Panel for Pandemic Preparedness and Response. May 2021. Accessed September 27, 2022. https://theindependentpanel.org/mainreport/.

3. Clawson J, Kellar J, Larsson S. Learning from COVID-19 to Transform Global Health Systems. Boston Consulting Group. May 5, 2020. https://www.bcg.com/publications/2020/learning-from-covid-transforming-health-systems.

4. Nimako K, Kruk ME. Seizing the moment to rethink health systems. Lancet Glob Health 2021;9:e1758-e1762. https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(21)00356-9/fulltext.

5. Mazzucato M. Mission Economy: A Moonshot Guide to Changing Capitalism. New York: Harper Business, 2021.

6. Emanuel EJ. Which Country Has the World's Best Health Care? New York: Public Affairs, 2020.

7. Health Expenditure and Financing. OECD Statistics. Accessed January 18, 2022. https://stats.oecd.org/Index.aspx?DataSetCode=SHA.

8. Statistics P. OECD Statistics. Accessed January 18, 2022. https://stats.oecd.org/Index.aspx?DataSetCode=HISTPOP.

9. Health Systems Finance: The Path to Universal Coverage. The World Health Report, 2010. World Health Organization. https://www.who.int/publications/i/item/9789241564021.

10. Brownlee S, Chalkidou K, Doust J. Evidence for overuse of medical services around the world. Lancet. 2017;390(6):156-68

11. Glasziou P, Straus S, Brownlee S, et al. Evidence for underuse of effective medical services around the world. Lancet 2017;390:169-177. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)30946-1/fulltext.

12. Shrank WH, Rogstad TL, Parekh N. Waste in the US health care system: estimated costs and potential for savings. JAMA 2019;322:1501-1509. https://jamanetwork.com/journals/jama/article-abstract/2752664.

13. Mateus G. Variations in Health Care: What Do We Know and What Can Be Done to Improve Health System Performance? OECD Health Policy Studies. 2014. https://www.oecd-ilibrary.org/social-issues-migration-health/geographic-variations-in-health-care_9789264216594-en.

14. Mahajan S, Caraballo C, Lu Y. Trends in differences in health status and health care access and affordability by race and ethnicity in the United States, 1999–2018. JAMA. 2021;326(6):637-48

15. Rosenberg BL, Kellar JA, Labno A. Quantifying geographic variation in health care outcomes in the United States before and after risk-adjustment. PLoS One.

16. Life Expectancy and Healthy Life Expectancy. World Health Organization Global Health Observatory Data Repository. Accessed January 11, 2022. https://apps.who.int/gho/data/node.main.688.

17. Health Status. OECD Statistics. Accessed January 11, 2022. https://stats.oecd.org/Index.aspx?DataSetCode=Health_Stat.

18. Wennberg JE. Time to tackle unwarranted variations in practice. BMJ 2011;342:d1513. https://www.bmj.com/content/342/bmj.d1513.

19. Tunis SR, Stryer DB, Clancy CM. Practical clinical trials: increasing the value of clinical research for decision making in clinical and health policy. JAMA. 2003;290(6):1624-32

20. Stacey D, Légaré F, Lewis K. Decision aids for people facing health treatment or screening decisions. Cochrane Database Syst Rev.

21. Tricoci P, Allen JM, Kramer JM, Califf RM, Smith SC. Scientific evidence underlying the ACC/AHA clinical practice guidelines. JAMA. 2009;301(6):831-41

22. Larsson S, Clawson J, Kellar J. The Patient Priority: Solve Health Care's Value Crisis by Measuring and Delivering Outcomes That Matter to Patients. New York: McGraw Hill, 2023.

23. ClinicalTrials.Gov. US National Library of Medicine. Accessed March 14, 2022. https://clinicaltrials.gov/.

24. Lathyris DN, Patsopolous NA, Salanti G, Ionnidis JPA. Industry sponsorship and selection of comparators in randomized clinical trials. Eur J Clin Invest 2010;40:172-82. https://onlinelibrary.wiley.com/doi/10.1111/j.1365-2362.2009.02240.x.

25. Flacco ME, Manzoli L, Boccia S. Head-to-head randomized trials are mostly industry sponsored and almost always favor the industry sponsor. J Clin Epidemiol. 2015;68(6):811-20

26. Kirchner JE, Smith JL, Powell BJ, Walz TJ, Proctor EK. Getting a clinical innovation into practice: an introduction to implementation strategies. Psychiatry Re 2020 ;283:112467. https://www.sciencedirect.com/science/article/pii/S0165178119307413.

27. Shojania KG, Sampson M, Ansari MT, Ji J, Doucette S, Moher D. How quickly do systematic reviews go out of date? A survival analysis. Ann Intern Med 2007;147:224-33. https://www.acpjournals.org/doi/10.7326/0003-4819-147-4-200708210-00179.

28. Shekelle PG, Ortiz E, Rhodes S, et al. Validity of the Agency for Healthcare Research and Quality clinical practice guidelines: How quickly do guidelines become outdated? JAMA 2001;286:1461-7. https://jamanetwork.com/journals/jama/fullarticle/194222.

29. The Lancet. Physician burnout: a global crisis. Lancet 2019;394:93. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)31573-9/fulltext.

30. Committee on Systems Approaches to Improve Patient Care by Supporting Clinician Well-Being, National Academy of Medicine, and National Academies of Sciences, Engineering, and Medicine. Taking Action Against Clinician Burnout: A Systems Approach to Professional Well-Being. Washington, DC: National Academies Press, 2019.

31. Yong E. Why Health-Care Workers Are Quitting in Droves. The Atlantic. November 16, 2021. Accessed February 23, 2023. https://www.theatlantic.com/health/archive/2021/11/the-mass-exodus-of-americas-health-care-workers/620713/.

32. Shanafelt TD, West CP, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life integration in physicians over the first two years of the Covid-19 pandemic. Mayo Clin Proc September 13, 2022. https://www.mayoclinicproceedings.org/article/S0025-6196(22)00515-8/fulltext.

33. Plsek P. Redesigning Health Care with Insights from the Science of Complex Adaptive Systems. In: Institute of Medicine Committee on Quality of Health Care in America. Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, DC: National Academies Press, 2001.

34. Rouse WB, Serban N. Understanding and Managing the Complexity of Health Care. Cambridge, MA: MIT Press, 2014.

35. Sturmberg JP. Health System Redesign: How to Make Health Care Person-Centered, Equitable, and Sustainable. Cham, Switzerland: Springer International Publishing, 2018.

36. Morieux Y, Tollman P. Six Simple Rules: How to Manage Complexity Without Getting Complicated. Boston, MA: Harvard Business Review Press, 2014.

37. International Consortium of Health Outcomes Measurement. Accessed December 5, 2022. https://www.ichom.org/.

38. Porter ME, Deerberg-Wittram J, Feeley TW. Martini Klinik: Prostate Cancer Care 2019. Harvard Business School Case 720-359, November 2019 (Revised December 2019). https://www.hbs.edu/faculty/Pages/item.aspx?num=56450.

39. Evans SM, Millar JL, Moore CM. Cohort profile: the TrueNTH Global Registry - an international registry to monitor and improve localised prostate cancer health outcomes. BMJ Open.

40. George DJ, Mucci LA, Kantoff PW, et al. IRONMAN: The International Registry for Men with Advanced Prostate Cancer. J Clin Oncol 2022;40:TPS190. https://ascopubs.org/doi/10.1200/JCO.2022.40.6_suppl.TPS190.

41. van Egdom LSE, Lagendijk M, van der Kemp MH, et al. Implementation of value based breast cancer care. Eur J Surg Oncol 2019;45:1163-1170. https://www.ejso.com/article/S0748-7983(19)30007-1/fulltext.

42. Ankersmid JW, van Hoeve JC, Strobbe LJA. Follow-up after breast cancer: Variations, best practices, and opportunities for improvement according to health care professionals. Eur J Cancer Care (Engl).

43. Deerberg-Wittram J, Lüdtke L. Value-Based Healthcare Delivery in Diabetes. Medtronic. September 2016. https://diabeter.nl/media/cms_page_media/130/Value%20Based%20Healthcare%20Diabeter%20White%20Paper.pdf.

44. Govindarajan V, Manikutti S. What Poor Countries Can Teach Rich Ones About Health Care. Harvard Business Review. April 27, 2010. https://hbr.org/2010/04/how-poor-countries-can-help-so.html.

45. Lundström M, Barry P, Brocato L, et al. European Registry for Quality Improvement in Cataract Surgery. Int J Health Care Qual Assur 2014;27:140-51. https://www.emerald.com/insight/content/doi/10.1108/IJHCQA-10-2012-0101/full/html.

46. Porter ME, Lee TH, Alger MA. Oak Street Health: A New Model of Primary Care. Harvard Business School Case 717-437. February 2017. https://www.hbs.edu/faculty/Pages/item.aspx?num=52357.

47. Myers G, Lee TH. Rebuilding Health Care as It Should Be: Personal, Equitable, and Accountable. NEJM Catalyst. August 3, 2018. Accessed February 22, 2023. https://catalyst.nejm.org/doi/full/10.1056/CAT.18.0120.

48. Dohmen P, De Sanctis T, Waiyaiya E, et al. Implementing a comprehensive value-based healthcare system to improve pregnancy and childbirth outcomes in urban and rural Kenya. Research Square. Preprint. November 23, 2021. https://www.researchsquare.com/article/rs-1071399/v1.

49. Horner B, van Leeuwen W, Larkin M, Baker J, Larsson S. Paying for Value in Health Care. Boston Consulting Group. September 2019. Accessed September 28, 2022. https://web-assets.bcg.com/img-src/BCG-Paying-for-Value-in-Health-Care-September-2019_tcm9-227552.pdf.

50. Struijs JN, de Vries EF, Baan CA, van Gils PF, Rosenthal MB. Bundled-Payment Models Around the World: How They Work and What Their Impact Has Been. Commonwealth Fund. April 2020. Accessed February 23, 2023. https://www.commonwealthfund.org/publications/2020/apr/bundled-payment-models-around-world-how-they-work-their-impact.

51. Buccheri S, Sarno G, Fröbert O. Assessing the nationwide impact of a registry-based randomized clinical trial on cardiovascular practice: the TASTE Trial in perspective. Circ Cardiovasc Interv.

52. Lauer MS, D'Agostino RB. The randomized registry trial — the next disruptive technology in clinical research? N Engl J Med. 2013;369(6):1579-81

53. Baicker K, Obermeyer Z. Overuse and underuse of health care: new insights from economics and machine learning. JAMA Health Forum.

54. Deist TM, Dankers FJWM, Ojha P. Distributed learning on 20 000+ lung cancer patients - The Personal Health Train. Radiother Oncol. 2020;144(6):189-200

55. Larsson S, Lawyer P, Garellick G, Lindahl B, Lundström M. Use of 13 disease registries in 5 countries demonstrates the potential to use outcome data to improve health care's value. Health Aff (Millwood) 2012;31:220-7 https://www.healthaffairs.org/doi/10.1377/hlthaff.2011.0762.

56. Smith B. CMS Innovation Center at 10 years — progress and lessons learned. N Engl J Med. 2021;384(6):759-64

57. Agarwal R, Connolly J, Gupta S, Navathe AS. Comparing Medicare Advantage and traditional Medicare: a systematic review. Health Aff (Millwood). 2021;40(6):937-44

58. Outcome-Based Healthcare 2018-2022. Government of the Netherlands (Ministerie van Algemene Zaken [Ministry of General Affairs]). July 28, 2016. Accessed September 28, 2022. https://www.government.nl/topics/quality-of-healthcare/information-on-the-quality-of-care.

59. Rubel J, Emanuel EJ. What US Health Agencies Can Learn from Singapore. Health Aff Forefront (Millwood). September 6, 2022. https://www.healthaffairs.org/content/forefront/us-health-agencies-can-learn-singapore.

60. White Paper on Healthier SG. Singapore Ministry of Health. September 21, 2022. Accessed September 28, 2022. https://www.moh.gov.sg/news-highlights/details/white-paper-on-healthier-sg.

61. Putting Value at the Center of Health and Care in Wales. A Three-Year Action Plan, 2019–2022. Welsh Government, NHS Wales. 2019. Accessed September 28, 2022. https://vbhc.nhs.wales/files/vbhc-national-action-plan/.

62. Porter ME, Larsson S, Lee TH. Standardizing patient outcomes measurement. N Engl J Med 2016;374:504-6. https://www.nejm.org/doi/10.1056/NEJMp1511701.

63. Lansky D. Reimagining a Quality Information System for US Health Care. Health Aff Forefront (Millwood). January 2022. https://www.healthaffairs.org/do/10.1377/forefront.20220120.301087/full/.

64. McGrath D. French Centres Adopt ICHOM Standards. EuroTimes. September 1, 2019. Accessed February 23, 2023. https://www.escrs.org/eurotimes/french-centres-adopt-ichom-standards.

65. Tripathi M. Delivering on the Promise of Health Information Technology in 2022. Health Aff Forefront (Millwood). February 22, 2022. https://www.healthaffairs.org/do/10.1377/forefront.20220217.71427/.

66. Health Expenditure and Financing. OECD Statistics. Accessed September 30, 2022. https://stats.oecd.org/Index.aspx?DataSetCode=SHA.

67. ARPA-H. National Institutes of Health. Accessed May 19, 2022. https://www.nih.gov/arpa-h.

68. Howard R, Grant J, Leyden T, Englesbe M. Improving the quality of health care through 25 years of statewide collaboration in Michigan. NEJM Catal Innov Care Deliv.

69. Howard R, Hallway A, Santos-Parker J, et al. Optimizing postoperative opioid prescribing through quality-based reimbursement. JAMA Netw Open 2019;2:e1911619. https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2751387.

70. Value-Based Procurement. MedTech Europe. Accessed October 7,2022. https://www.medtecheurope.org/access-to-medical-technology/value-based-procurement/.

71. Innovative Health Initiative. IMI Innovative Medicines Initiative. Accessed July 13, 2022. https://www.imi.europa.eu/about-imi/innovative-health-initiative.

72. Stamm T, Bott N, Thwaites R, et al. Building a Value-Based Care Infrastructure in Europe: The Health Outcomes Observatory. NEJM Catalyst. June 9, 2021. Accessed February 23, 2023. https://catalyst.nejm.org/doi/full/10.1056/CAT.21.0146.

73. Global Coalition for Value in Healthcare. World Economic Forum. Accessed October 7, 2022. https://www.weforum.org/global-coalition-for-value-in-healthcare.