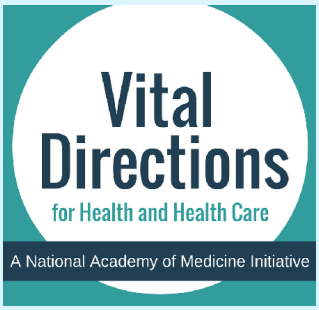
Systems Strategies for Better Health Throughout the Life Course

A Vital Direction for Health and Health Care

J. Michael McGinnis, National Academy of Medicine; **Donald M. Berwick,** Institute for Healthcare Improvement; **The Honorable Thomas A. Daschle,** The Daschle Group; **Angela Diaz,** Mount Sinai Icahn School of Medicine; **Harvey V. Fineberg,** Gordon and Betty Moore Foundation; **The Honorable William H. Frist,** Vanderbilt University; **Atul Gawande,** Brigham and Women's Hospital; **Neal Halfon,** University of California, Los Angeles; **Risa Lavizzo-Mourey,** Robert Wood Johnson Foundation

September 19, 2016

About the Vital Directions for Health and Health Care Series



This publication is part of the National Academy of Medicine's **Vital Directions for Health and Health Care Initiative,** which called on more than 100 leading researchers, scientists, and policy makers from across the United States to assess and provide expert guidance on 19 priority focus areas for U.S. health and health care. The views presented in this publication and others in the series are those of the authors and do not represent formal consensus positions of the NAM, the National Academies of Sciences, Engineering, and Medicine, or the authors' organizations. Learn more: **nam.edu/VitalDirections.**

Introduction

Health and health care outcomes for Americans should be better for most, and much better for some. This should be possible with currently available knowledge and resources. Capturing the potential will require adapting our strategies and approaches to the reality that health is not immutably determined at birth, but shaped by different factors over time. Similarly, caring for health cannot be confined to singular interactions within the walls of the health care system, but must fully engage powerful determining influences residing in other systems—e.g. education, employment, justice, transportation—which are natural parts of our lives. Exploring the nature and strategic opportunities inherent in these intersecting influences is the focus of this paper, and the implications for societal attention and resources suggest the promise of shifting emphases across the life span, across systems, and within the health care system.

Our assessment begins with an overview of the prominent health and health care challenges for Americans, and they are many. U.S. life expectancy at birth ranks 43rd in the global community, and has even recently declined among some specific groups (1). Unacceptable disparities in health outcomes and access persist among certain populations, in particular African-Americans and Native Americans (2). The U.S. health system ranked in a World Health Organization assessment only 37th in performance among 191 member nations (3), and in a recent study of 11

highly industrialized OECD nations, the U.S. ranked last (4). These deficiencies are all the more glaring in the face of health expenditures that are clearly the highest in the world, about 50% higher than the country next behind us, and requiring investment of nearly 18% of our total economic productivity (GDP) in 2015 (5). Why are we performing so poorly relative to our potential? A major reason lies in the fact that the foci of our attention, our resources (6), and our incentives are too narrow and too late: despite an increasingly strong and specific understanding of the preventable elements in the development of many of our health challenges—social, behavioral, environmental—our investments are primarily directed to their biomedical manifestations, well after the problems have taken root.

Health is the product of our experiences layered onto the biological matrices we inherit. Those experiences begin at conception, and, through the intersecting influences of genetics, environment, social circumstances, behaviors, and medical care, health emerges and takes form. Each of us represents, in essence, a complex system in constant and dynamic interface with other systems that shape our fates in manners great and small. The process is not linear, but one in which similar experiences may exert variable influences at different points. In this paper, we explore the implications of these dynamics for efforts to improve health prospects throughout those interwoven influences at various stages over the course of people's lives (7). Because emerging health problems and potential required solutions span well beyond a single determining factor or single point in time and place, it is necessary to take a systems-oriented perspective (8). In doing so, we respect the simple fact that optimal health will not be achievable or affordable—for society or individuals—without attention to the effectiveness, efficiency, and availability of essential services within and among the various sectors important to health outcomes.

Fortunately, transformational insights, tools, and initiatives are emerging that offer practical prospects for dramatic advances in the ability to mobilize information, cooperation, and collaborative action for more effective and efficient progress from the national down to the community and individual levels, on behalf of better health throughout the life course. We review these prospects by touching briefly on several questions:

- What are the most common health threats at each stage throughout life?
- Whatare the root sources of diseases, disability, and death most prominent among Americans?
- Why do we spend so much and get so little for our national health system investment?
- Which systems and partner stakeholders must be more seamlessly engaged?
- How can financing, accountability, technology, and culture be aligned to foster system-wide transformation for better health over the life course?

Health and Disease Over the Life Course

What are the most common health threats at each stage throughout life?

In terms of morbidity and mortality rates, health profiles vary substantially by life stage, Four of every ten childhood deaths, before age 15, occur in among babies in their first 28 days of life (9), about half due to congenital malformations, disorders related to short gestation and low birth weight, and maternal complications during pregnancy (10). Throughout infancy—the first year of life—the major causes of death are complications related to birth and birth defects, sudden infant death syndrome (SIDS), and unintentional injury (11). After age 1, injuries take over as the leading cause of death among children (12), and hold that position until age 44, followed by heart disease, cancer, and homicide, at different times and ages. Among adolescents and young adults, ages 15 to 24, suicide and homicide appear among the leading killers (13), ranking number 2 and 3, respectively among this age group. In adults ages 35 to 65, the major causes of death are cancers and heart disease (11), and after age 65, heart disease is the leading cause of death, followed by cancer and respiratory disease (13).

But illnesses and injuries that are counted most easily are often not the experiences most important to health prospects. Life expectancy at birth in the United States is now more than 81 years for females and 76 years for males, and for most of those years health status is more a reflection of the presence or absence of illness or injury, consequent level of function, sense of well-being, or predispositions, circumstances, or experiences that influence future profiles on these dimensions (14). Although death is the most striking, definitive, and tragic reflection of health status, it is far

too limiting as a measure of the health of a population (15). In the U.S. in 2013, for example, there were fewer than 15,000 total deaths among the nearly 75 million children under age (14), but nearly 25 million were overweight or obese, more than 30 million lived in low income families and 15 million in poverty, in the range of some 5 million lived in a household touched by violence (16, 17), more than 1 million were the victims of child abuse and neglect (18), with the highest rates among the youngest (19, 20). In 2015, about 1.1 million people under age 75 died, but those who suffer from diabetes, depression, and alcohol abuse, amount to 18, 11, and 15 times that number, respectively (21, 22).

In this respect, the most important childhood determinants of health over the life course are at least as much those related to the caring, social, environmental, and behavioral experiences, as to health services received. This is especially the case for ages 0 to 3, when central nervous system development occurs at such a rapid rate, with ongoing development of physical stature and physiologic function. Advances in neuroscience have provided a much deeper understanding of brain development in the early years, as well the remolding during adolescence that sets the stage for issues with lifelong consequences—e.g. overweight and obesity, substance abuse, psychological disorders (23). It is often assumed that children are generally healthy and, if they suffer a health problem or developmental delay, they will grow out of it. However, while children can be resilient, adversity during these sensitive developmental periods is often embedded, only to emerge years later as a source of disability and ill-health (7, 24, 25). The role of attention and nurturing as an influence on health status, nearly always a relevant determinant, may not be again as relatively important a focus until the final years of a natural life span (26).

Over a lifetime, acute infections represent the most frequent sources of short-term functional limitation among all age groups, with asthma and short term injuries increasing in later childhood, and obesity and depression occurring at higher rates as children move into adolescence (27). In adolescence and young adults, substance abuse emerges as a more common near- and longer-term health threat (28), as does risky sexual behavior and violence in some populations. In the past 15 years, opioid addiction rates have rapidly increased, particularly in white, rural communities, in part as a result of neglectful prescribing behavior among clinicians, in part as a result of segmenting and marginalizing the treatment strategies for those with pain and behavioral health problems (29). Addiction rates among active duty military personnel, which had previously been on the decline, tripled from 2005 to 2008, and rates of depression and suicide and post-traumatic stress disorder also increased (30, 31).

Throughout adulthood, various exposures, experiences, and lifestyles contribute increasingly to disease and injury, the rate and impact compounded by growing co-occurrence of multiple diseases and conditions. Among those over age 50, nearly half suffer from arthritis, 28% have heart disease, approximately 25% are overweight or obese, 22% have cancer, and 6.5% have lung disease (32). Approximately 45% of those over 50, and 75% of those over 65, report multiple co-occurring conditions that restrict their activities in some fashion (33). Among people over age 75, approximately 14% suffer from some form of dementia. The societal impact is crippling from the increased occurrences of obesity, diabetes, depression, and dementia (34). Successfully reducing the occurrence of most of these conditions, and the extent of incapacities imposed, requires multifaceted, life course-oriented strategies.

Health Disparities

Some people—and some groups—differ substantially from the aggregate profile. Differences occur among various race, ethnic and socio-economic groups, but the largest overall disparities occur among African Americans relative to whites. For example, despite the relative safety of gestation and birth in the United States, African-American babies are more than twice as likely to be born with a low birth weight or to die in their first year of life (35, 36). Interestingly, babies born to mothers who are immigrants from Africa experience low birth weight and related problems at rates similar to whites, suggesting the existence of other factors or stressors for African-Americans (37).

Beginning at birth, the experience of disparities tends to accumulate and widen over time. Black children are twice as likely as white children to have asthma, and obesity is twice as common among American Indian children compared to their white and Asian counterparts (38). Obesity disparities emerge as early as preschool (39), and the prevalence of overweight

and obesity among black girls ages 2 to 19 is about 6% higher than for their white counterparts (40). Because obese children are at higher risk for obesity and cardiovascular disease as adults, the disadvantage extends into adulthood.

Almost one half of black adults suffer from hypertension, the highest population-specific prevalence in the world (41). The annual incidences of stroke and heart disease among African-Americans in the United States are about 2 and 1.5 times, respectively, those among whites (42). Although the yearly cancer incidence among African Americans is about the same as whites, cancer death rates projected through 2018 for African Americans are expected to be about 14% higher for women and 27% higher for men (43). Rates of Alzheimer Disease and other dementias among African Americans, range in estimates from of 14% to 100% higher (44). Life expectancies are shorter for African-Americans by about 3 years for women, and 5 years for men (45). On the other hand, for those who reach age 75, the difference in life expectancy between whites and blacks is only about 0.4 years (14).

The Determinants of Health

What are the root sources of disease, disability, and death most prominent among Americans?

Why do different groups and individuals demonstrate such different health profiles? A great deal has been learned in the relatively recent past about the answer to these questions, and the answer is not "fate". As noted earlier, health is the measure of our functional capacity that results from the interplay of factors in five domains shaping our life courses: our biological predispositions, social circumstances, physical environments, behavioral patterns, and access to the health care we need (46). Figure 1 presents a schematic of how some of these factors might play out to shape health status and health prospects at various times and in various circumstances (47).

Biologic predispositions

Point: It is not all about genes. The starting point is indeed with our genes, the predispositions we inherit from our parents. Although very few diseases can be classified as purely genetic in nature, work throughout the world daily identifies new associations between known conditions and specific gene profiles. Importantly, however, more is continuously being learned about epigenetics, the multiple cellular and molecular mechanisms by which genes can be turned on or off and the information modified as it is expressed in cells by different exposures and experiences, and even how experience-related epigenetic modifications can be passed on to subsequent generations. As insights deepen about sensitive periods of health development

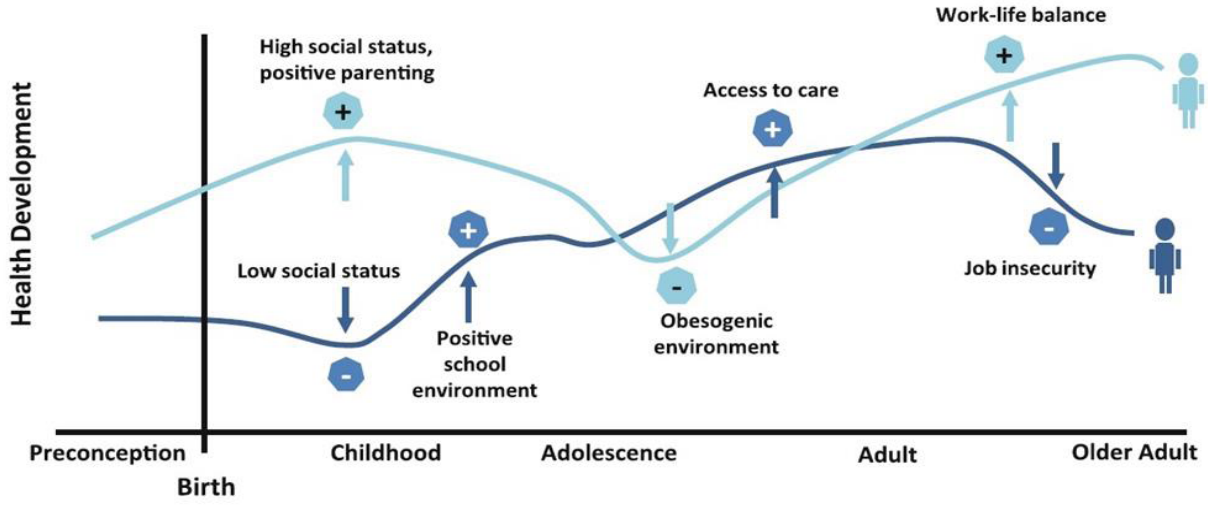


Figure 1: Schematic of variable life stage influences

Source: Halfon, N., Larson, K., Lu, M., Tullis, E., & Russ, S. (2014). Lifecourse Health Development: Past, Present and Future. Maternal and Child Health Journal, 18(2), 344–365.

and how the impact of the interactions of our individual gene compositions with our physical, social, and behavioral environments, the better equipped we will be to act on that knowledge in ways that buffer impacts and optimize health development over the life course.

Medical Treatment

Point: It also is not all about medical care, unless one is ill or injured. In 2015, total U.S. expenditures for health were about $3 trillion, with medical treatment receiving more than 90% of the total. Yet, the impact of those expenditures on the aggregate health of the population was very limited (48). They were not expenditures aimed at the factors most important to the nation's health profile. Shortfalls in the access or quality of medical care are especially surprising in the context of the high U.S. expenditures, and require remediation, but other approaches are required for better health. Illustrative is the fact that approaches to improve birth outcomes and address disparities that have primarily focused on enhancing access to prenatal care, have proven insufficient in achieving the gains possible (49, 50). Addressing barriers to care access is a basic social responsibility, but effective engagement of health improvement opportunities requires strategies and investments that are broad and multisystem in nature.

Behavioral Patterns

Point: Health behaviors are central, but are also more than choice. Among the influences on health, those related to behavioral patterns represent the single most prominent preventable source. Tobacco, dietary factors, physical inactivity, and alcohol misuse, account for many preventable deaths among Americans, including from coronary heart disease, stroke, cancers of the colon, breast, and prostate, and diabetes (49). Diet and physical activity factors together account for about a third of preventable premature deaths among Americans (51). Unintended pregnancies significantly impact individual and community health, yet one in three births in the U.S. is unintended, including most of those born to teens (52, 53). Illicit drug use is one of the few leading causes of death with increasing rates, and along with alcohol abuse, imposes a broad and leading social, morbidity, and mortality burden on Americans and their communities (54). Behaviors are, however, driven at least as much by external factors as internal, as, for example in the access and affordability of healthy foods. They are reflections of culture, access, economics, and other factors such as the quality of early experiences and the central importance of supportive human relationships, underscoring the intersections among the domains of influence that require sustained system-wide strategies across communities.

Social Circumstances

Point: For many, health is substantially about social circumstances (55). Health is powerfully influenced by our social conditions and services—education, income, employment, housing, neighborhoods, racism, social networks (56). For the population as a whole, the most consistent predictor of the likelihood of death in any given year is level of education. For those ages 45 to 64 with limited education, the chance of death in a given year is four times those with graduate degrees (57). Income levels have consistently been associated with life expectancies, and one measure of income inequality, holds that a one percent increase in inequality doubles the likelihood of death over a decade (58), presumably due to disproportionate exposures to neighborhood violence, suboptimal school environments, and unstable households (59). Also important is that *perceptions* matter—perceptions of income inequality, perceptions of limited choices, perceptions of community cohesion (60). Stress "gets under the skin" and exerts an effect that can grow over the life course (61, 62, 63).

Physical Environments

Point: The pace of progress will reflect the integrity of our environments. Environments affect health in myriad ways: silent and invisible inadvertent toxic exposures to workplace and product hazards; zoning and design features of our built environments that structurally impair or facilitate health promoting or health degrading life and workstyle patterns; ecosystem changes from human activities that foster novel zoonotic infections (64). Two of the largest and most rapidly occurring epidemics to confront the United States—and the world—in recent years have roots in changes in our physical environments: obesity and HIV. They also underscore the intersecting character of the domain determinants, and the importance of tending simultaneously to the dynamics across systems of influence.

Causes and Consequences of System Shortfalls

Why do we spend so much and get so little for our national health system investment?

Substantially, this is due to constraints on our lines of sight. Because most health improvement efforts—disease and injury prevention, treatment, and rehabilitation—are designed around a single encounter or issue, it is there that they often end. Immunizing a toddler, delivering a baby to a young mother, setting a broken arm, counseling someone depressed, testing a blood sugar level, screening for high blood pressure, treating a leg ulcer, explaining an employee safety program, preparing a school meal plan, scheduling for chemotherapy, preparing a hospital discharge, each represents the dedicated work of a skilled health professional usually delivered with a focused sense of purpose in anticipation of the best result. Yet the reasons care is needed, and the likelihood of its optimal impact on health prospects, depend on myriad factors beyond a single precipitating event or diagnosis, such as a heart attack, stroke, or diabetic retinopathy—factors that include the interplay of behaviors, environments, socioeconomic status, ethnic and gender biases and prejudices, factors that can course throughout communities and throughout lives. Our aims must clearly orient beyond the singular (65).

Certainly, our payment and reward systems focus on the singular and the serial—occurrence of an illness and its treatment, sometimes repeatedly. Health care financing is largely structured around separate charges for individual components of services provided for a particular diagnosis, presenting powerful organizational and financial disincentives to the health care stewards we trust to be focused on producing optimal health results for patients and families. Even when focus is turned to results rather than services—value rather than volume, as the saying goes—unless incentives are aimed to present and engage the longer term, multisystem factors often involved, attention will be more naturally drawn to a near term and narrow single condition perspective (66). A clinical team attempting to help a person manage diabetes will be substantially hindered the focus is limited to the presenting vital signs and blood chemistry profiles, when the most basic success factors reside in patient distinctions as to medication cost and access, literacy, family circumstances, mobility, digital accessibility, dietary patterns, employment status, neighborhood character.

Economic Implications

Consequences of short-term and narrowly-focused interventions are not only registered in underperformance with respect to morbidity and mortality tables. Performance inefficiencies and shortfalls are expensive. Costs are personal to people and their families, they are collective to organizations whose efficiency and effectiveness are tightly linked to the health status of those who populate them, and they are societal to populations whose aggregate vitality and capacity are sapped both by the economic burden of waste and by the dispiriting and debilitating impacts of unnecessary disparity and marginalization.

Children born in low income, high risk circumstances, and who are not seamlessly linked to the support they need, risk being delayed or disabled from the outset. The lifetime costs of the resulting services required and lost productivity experienced will likely far exceed what would have been the cost of the initial investment. Without effective linkage of activities, as indicated, among schools, clinicians, social service, law enforcement, and juvenile justice organizations, teens and young adults who are passing through the challenges natural to that period will be placed at greater risk—and lifelong expense and loss of income potential—from issues such as pregnancy, alcohol and drug abuse, depression, and violence. People who live and work in communities in which the cultural signals, norms, and opportunities are aimed at fostering attention, support, and priority to health and health-promoting strategies are more likely to be healthier, with the attendant personal economic advantages.

At the organizational level, the burden of our failure to capture system-wide opportunities for greater efficiencies can be considerable. In 2011, hospital readmissions due in part to missed opportunities to better manage care coordination at discharge, imposed more than an estimated $40 billion dollars (67, 68, 69, 70). The cost of lost productivity due to illness imposes a substantial burden on workplaces, often generating costs well beyond those for health care alone (71). In the aggregate, the full, extent of the economic consequences of our fragmented system are unknown, but

the costs are staggering. We do know from various studies that about 30% of overall health expenses in the U.S. is unnecessary—the costs of unneeded services, care delivered inefficiently, charges that are too high, excessive administrative costs, missed prevention opportunities, and fraud (72, 73). Beyond this, are the personal and social costs imposed by unwanted pregnancies, learning disabilities unaddressed, overweight and obesity, alcohol and substance abuse, criminality and incarceration, and others that could potentially be avoided or modified if the interfaces and incentives were aligned for their cooperative engagement. Still more consequences reside in the resulting loss of economic productivity among those affected.

Potentially Transformative System Partnerships

Which systems and partner stakeholders must be more seamlessly engaged?

Harnessing society's full potential for optimizing health outcomes across the lifespan requires reaching out well beyond the health care system, from the earliest days of childhood. That potential is determined by the robustly networked interplay among systems and services that, in diverse ways, have central bearings on health prospects, and for which insights are applicable from other sectors using integrative platform models to manage the flow of goods and services (74). Examples follow of some of the relevant stakeholders identified in the discussion of the issues mentioned here.

Clinicians, Health Care Organizations, Pharmcies

Across the board, no country can claim a cadre of health professionals that is more skilled, more dedicated, or more highly resourced than those in the United States. Yet, clinicians and health care organizations often are challenged in addressing issues of great social and developmental importance to patients (75). Prevailing cultures, financing, standards, accountability, accessibility, and organizational structures are largely designed to foster narrow perspectives and poorly coordinated activities, certainly between health care and other systems important to optimizing health prospects, but also among different health care institutions providing relevant services, and even among service units within the same organization. Successful models of team care, linked interventions, and information system platforms indicate not only that the care delivery process itself can feasibly operate in a fashion transformative for near-term and lifelong health prospects, but it has the potential to operate as system that continuously learns and improves (76, 77). By promoting consistent leadership messaging on health progress, underscoring key trends, identifying groups within their own institutions with disproportionate shortfalls, emphasizing the intersecting system-wide influences, indicating steps to marshal community-based corrections and monitoring progress within their own communities, effective leaders can move organizations beyond disconnected efforts to implement system-wide strategies for better health.

People and Their Families

Since the appearance of the first village healers, health and health care have operated through a flow of authority and expertise that went in only one direction, from healer to patient. With transformations in access to knowledge and tools, the prospects are at hand for an unprecedented democratization of health and health care decision-making and delivery (78). Unimagined a generation ago, the speed at which advancing digital technology has put health improvement potential literally at our fingertips is simply stunning (79). Already possible is support through virtually immediate access to information and assistance, on-line and real-time advice and counseling for specific circumstances, rapidly growing applications for decision assistance for a variety of health and medical issues, GPS (geographic positioning) tailored care access and care monitoring facilitation, remote site diagnosis and assessment of certain laboratory and physiologic parameters, and even the early stages of remote site therapeutic measures. Patient portals and tele-consults have already improved the quality of information available for ongoing care, reduced the need for outpatient visits in many facilities, and made possible improved care for homebound and geographically distant people. The growing capacity for gathering, assessment, and use of individual clinical data dramatically accelerates to prospects for continuous learning and care that is better tailored to an individual's life course circumstances. Rate limiting factors relate not so much to technologic constraints as to equitable functional access, the need for

greater priority on system interoperability, the development and testing of reference standards to ensure reliability, cross-sector strategies for deployment, and adoption of an operative personal linkage approach to allow the service integration, improvement, life course tailoring, and learning that is technically feasible.

Social Services

In the spirit of the adage that the advancement of a society can be judged by the way it treats its most vulnerable, some of our most important gains as a nation have come as a result of efforts to reach out and engage the basic needs of the poor and the isolated. As a society, there is substantial common ground on the basic notions; that every person has the basic food and shelter they need; that care is available to all pregnant women; that newborns and their mothers have the appropriate services required; that young families contending with unfamiliar experiences and new financial pressures have helpful assistance, including the lifelines and links of home visits if required; that young children get an early start with positive socialization and educational experiences; that schools and care organizations be alert for social circumstances placing children in jeopardy; that those who are ill, infirm and homebound have ready access to assistance that meets them where they are; that those in the late stages of life suffer as little pain, displacement, and as little loss of dignity as possible. Although these are social values around which beliefs are broad, the public and private efforts to act upon them can often be sporadic, disjointed, uncoordinated, with limited follow-through—multiple organizations tending individually to responsibilities for narrow segments of the needs. Promising intersectoral and multisystem models have been demonstrated for high health care utilizers—the so-called "hot spotters" (80)—through the work of various organizations. The Camden Coalition used targeted and tailored multi-faceted services with a group of high cost, high utilizer individuals and reported a 50% reduction in costs and hospital visits (81). A community-oriented organization, Health Leads, using a multidisciplinary team-based model to address connect high risk individuals with community-based resources such as employment, health insurance, and food, reported broad-based positive impact in reducing those needs (82). The Commonwealth Care Alliance is a not-for-profit delivery system for complex medical nee patients served by Medicare and Medicaid. Using multidisciplinary clinical teams, their Senior Care Plan model reported nearly half the rate of hospital stays of those in fee for service plans, as well as much lower medical spending growth over 5 years (83). These promising results suggest the need to deepen the partnership between clinical and social organizations in the interest, first, of the patients served, but clearly as well for community and financial sustainability.

Public Health and Safety Agencies

Public health holds society's front line responsibility for identification and engagement of health threats to the population. Many of the most important health gains of the past century have come as a result of public health measures ranging from those of sanitation and hygiene to safer food, reductions in deaths among mothers and babies, immunization and infection control programs, and on to campaigns on tobacco and lifestyle issues. The effectiveness of public health has long been dependent on a close relationship with the clinical community, and, if the number and variety of newly emerging diseases is increasing with population expansion and ecosystem change—e.g. Lyme Disease, HIV, SARS, Ebola, Zika, among others—the seamless interface of public health and clinical care systems is essential. Of related importance is the ability of public health be able to draw upon, and share the results of, emerging laboratory, genetic, GPS, information processing, and crowd sourced data for strategic communitywide planning and response. Simply stated, public health should be a central steward of system interfaces and strategic direction for better health throughout the life course.

Schools and Pre-School Facilities

Virtually every child in the nation attends a school, and, while education has to be the first priority for our schools, for too many children, their school is the closest thing they have to an agent with a dedicated interest in their welfare. Beyond the fact that educational level is the most powerful determinant of lifelong health prospects, schools have also served as the anchor locus for community health interventions such as immunizations, drug and alcohol use, teen pregnancy, and health behavior efforts. If schools are to be able to effectively manage their basic educational responsibilities, while also helping advance the agendas of the

health and social service sectors, the communication interfaces with those sectors have to be as seamless and fluid as possible, the data bases interoperable, and the reward structures fully aligned.

Income and Payment Organizations

Employers have a clear incentive for keeping their workforces healthy, as do those who manage the health care payments for their employees and other stakeholders. Although as a group, no sector may have a greater stake in the long term health prospects of the population as a whole, whether from a productivity or cost of care perspective, the current payment systems, as well as the rate of turnover among employee groups and beneficiaries, all provide adverse incentives for the longer term view needed. Shorter term approaches oriented to value-based and bundled payment models are of interest, as are accountability initiatives tailored to focusing payments on proven interventions. But for these stakeholders to be able to bring to bear their considerable influence in the interest of system-wide strategies for better health throughout the life course, the prevailing payment system will have to move more directly to one that aims to improve overall population and community-wide health outcomes, with accountability measures directed to and focused on system-wide performance in improving health. Similarly, state flexibility to use Medicaid and other categorical federal funding to improve a shift to population-based care and accountability structures may help reduce fragmentation and stimulate systems-oriented leadership and integration at the community level.

Broadcast and Social Media

The nature of our digital lives is changing so rapidly, it is difficult to know the trajectory of its evolution. But it is clear that it is a rapidly spreading and global force that is likely to have a very important influence on health-related dynamics over the life course. The use of social media, by virtue of its nature, has the ability to instant cross lines of previously disparate and separate sectors. Whether from the perspective of the use of communication channels to influence perspectives, or to draw attention to emerging problems, or to rally support for action, or to use crowdsourced data as a research tool, this is an arena of direct relevance for life course strategies.

Consumer Product Retailers

Marketing is a clearly established accelerant of human behavior, for better or for worse. Television marketing in the 1950's and 1960's drove the ascendance of cigarette use and pushed tobacco to the leading spot among the nation's killers. On the other hand, televised counter-tobacco marketing in the time from 1968 to 1970 yielded the historically steepest decline in tobacco use, and actually led to some relief in the tobacco industry when television advertising—and the mandatory counter-ads—were eliminated. Advertising of food products targeted to children clearly had an impact on their attitudes and food choices, and probably on the rates of childhood obesity. The potential effectiveness of sustained social marketing strategies to facilitate positive behavior change suggests that marketing awareness is clearly relevant to conceptualizing life course strategies for health improvement (84).

Law Enforcement and the Courts

The nation is currently experiencing a resurgence of addiction, in this case fueled by increased use of opioids by young people. Accordingly, we are reminded of the central role of the law enforcement and the courts in any strategy aimed at effective engagement of those afflicted with addiction. Police have clearly said "We can't arrest ourselves out of this problem." These circumstances, as well as those in which the first surfacing of childhood endangerment may be in family courts, underscore the critical importance of common agendas and strong and effective communication channels between and among the justice, social services, education and clinical care systems.

Community Commons Stewards

Sustained multi-system progress for health improvement across the life course starts where people live, work, and play. In part, health care organization leaders can play a natural role in this respect. Hospitals can advance community-wide strategies for health improvement, and have an economic incentive to do so, via community benefit programs. Municipal public health departments are poised to steward a coordinated agenda linking health, community, and economy in development efforts. Community agencies planning and setting not only standards for food, sanitation, and environmental safety, but also standards for green space,

for activity friendly building designs, for zoning in the placement of fast food and alcohol outlets, for working with employers in the development of community-wide initiatives, all can have important influences on the extent to which a community culture of continuous health improvement becomes a central element of a community's identity (85). Community leadership, with the elected leader at the lead, is central to fostering the bridges across sectors, and ensuring the establishment and tracking of key indicators necessary for attention and progress throughout the life course (86).

Vital Directions for Better Health Throughout the Life Course

How can financing, accountability, technology, and culture be aligned to foster system-wide transformation for better health over the life course?

With so many issues and stakeholders—in the face of such complexity—how can a life course, systems-oriented approach be envisioned, much less implemented? Our view is that it is substantially achievable with more effective use of the tools and aggregate resources already available and in use at some level today, but which require the leadership and will to refine, implement, and spread: 1) health care financing that supports and rewards health improvement at the population level, in addition to the best care for individuals; 2) a parsimonious set of validated core measures to drive sustained systems-wide focus and accountability for actionable factors most important to health—the vital signs for our vital directions; 3) seamless digital connectivity affording operative real-time interfaces across sectors and across time; and 4) a transformative culture of health equity and continuous health improvement in every community throughout the nation. Each can be accomplished, and is dependent only on strong collaborative-minded public and private leadership at every level—national, state, local, organizational, and individual (87, 88).

Vital Direction: *Shift health care payments to financing that rewards system-wide health improvement.* Basic expenditure principles—personal, private, and public—include: know what you want, know its price, pay for its delivery. Because for the prevailing health care financing pattern, none of these pertain, our payment model has resulted in substantial system distortions. With larger and larger sums in play, health care payments are made not for health outcomes or treatment packages, but for many—sometimes hundreds—of individual components; the prices of either those individual components or their likely total cost is rarely known until completion of a course of uncertain duration; and, as noted, payments made are often unrelated to delivery of results (89). The result is a fragmentation of incentives down to a focus on the smallest possible unit, rather than the overall performance of the system for an individual or a population. We pay for illness, not for health (90). If we are to forge effective interfaces among the various system elements importantly shaping health outcomes, then payments need to shift to reward overall system performance in delivering those outcomes, including incentives for more effective attention to children at risk (91). Some prepaid health plans—e.g. Kaiser Permanente, Group Health, parts of Geisinger—are based on this philosophy and, as a result, tend to have more prominent community-facing dimensions. The Centers for Medicare and Medicaid Services has initiated a broad-based payment Learning and Action Network with the aim of developing alternative payment models for accelerated transition from payments for individual services, ultimately to a system profile that maximizes payments based on value delivered to a population (92). By assuming financial responsibility for specific populations, health care organizations have a vested interest in better linking to the community, including local health and social service departments, schools, senior centers, and faith-based institutions. What's required is a substantial acceleration of the progress toward a health financing system that clearly supports and rewards health improvement at the population level, in addition to the best care for individuals (93).

Vital Direction: *Initiate multi-level standardized measurement of system performance on core health indices.* In order to make progress toward better health, we must know where we stand—on representative issues for each of the dimensions most important to health: health care, social circumstances, environment, health behaviors, individual and community engagement, and, of course, health status. The challenge is that if the measures are too numerous and are incon-

sistently formulated from place to place and time to time, they are ineffective and even counterproductive. There remains an urgent need to align and condense our current measurement approaches to a core set of standardized measures reliably available for broad comparison across institutions and across time. If our restructured payment systems are aimed at a substantially improved focus on results—on the performance of the system in producing better health in the near and the long term—then our assessment models must be similarly designed to assess system performance. Ironically, as we have become better able to measure clinical activities, and as our focus on accountability has imposed requirements for more measurements, the result has actually been to shift focus away from the performance of the system to the delivery of individual services. Moreover, multiple, often incompatible approaches to measuring delivery of the same service, have further complicated the issue. Across clinical care, thousands of individual measures are collected to measure results on hundreds of clinical conditions, and without harmonization the opportunities for reliable cross-institutional or system-wide lessons are highly limited. On the grounds that a small set of standardized and harmonized core measures, aimed at system performance should be collected at every level—national, state, communal, and, as indicated, institutional—the Institute of Medicine's recent report, Vital Signs, recommends such core set. It proposes just 15 core and composite measures of health, health care, costs, and engagement, including measures such as high school graduation rate, teen pregnancy rate, and obesity. Additional refinement remains for practical implementation of the 15 measures at all levels, but, again, this is a feasible potential tool to shift attention and action to broader and more effective system interfaces and performance. We need vital signs to assess and direct progress toward our vital directions.

Vital Direction: *Speed development of a universally accessible and interoperable digital health platform.* The most basic element defining a system is the network of nodes important to a functional objective—improving health for a defined population—and basic to the effectiveness of the system's operation is the timeliness and reliability of information flow among those nodes. In a substantial departure from the historical limits, we now have the practical possibility of virtually instantaneous communication among the stakeholders. The barriers that exist to achieving that possibility are formidable, but they are not technically prohibitive. Agreeing to standards for interoperability, assuring their system-wide application, working out use and privacy protocols, ensuring interface and personal access capacities for individuals, embedding analytic tools for continuous learning, these are all feasible and their accomplishment would establish the infrastructure for transformative multi-system, multi-sectoral, initiatives enabling life course oriented strategies for health improvement. With our rapidly accelerating capacity for real-time linkage and learning, we have in place the potential to establish and grow a continuously learning and improving health system.

Vital Direction: *Foster awareness and action on a community culture of continuous health improvement.* Ultimately, transformative changes in health and health care require transformative leadership and action at the community level. Effective integration, application, and assessment of multi-sector and multi-domain strategies to mobilize the clinical, social service, educational, voluntary, commercial and related stakeholders—to mobilize the citizenry—on behalf better health for all, requires leadership to catalyze the emergence of the community-wide vision of the possible. It takes a culture change on many dimensions, away from one that is focused on the narrow and proximate, to one inspired by what is feasible to achieve, and how to achieve it, for the issue that ultimately matters most to people: their health, the health of their families and the health of their neighbors. This is the aim, for example, of the Culture of Health movement envisioned by the Robert Wood Johnson Foundation (94). Building on what has already been demonstrated on the ability to use a well-developed digital platform to improve services and linkages and to accelerate knowledge and evidence development, as well as what has been accomplished by continuous improvement initiatives in health care and elsewhere, the beginnings of a move toward a community culture of continuous health improvement are also in place. Using provisions of the community benefit requirements in the tax code that compel the many non-profit health care organizations to assess and work toward meeting community needs,

tools are available for community leaders to mobilize support and movement toward a transformative community health culture.

Conclusion

Especially given the considerable resources available and used in the American health care system, we are substantially underperforming. On the other hand, compelling and actionable knowledge is now available about the ways in which health is shaped from its very beginning by factors outside the health system, as well as how engaging those factors more effectively can improve health prospects over a lifetime. With the tools available and the prospect of reinforcing leadership, technical assistance, and policy initiative from the national, state, and private sectors, the possibility should be at hand for better health prospects at the start of life, throughout its course, and at its conclusion. By aligning financial incentives, by employing measures that drive attention and accountability to where it matters most, by taking advantage of the potentially stunning power of the emerging digital platform, and by determined efforts to strengthen community capacity to catalyze necessary changes in community culture and priority, substantial advances in health, health care, and health equity is attainable for Americans.

Summary Recommendations for Vital Directions

1. Shift health care payments to financing that rewards system-wide health improvement.
2. Initiate multi-level standardized measurement of system performance on core health indices.
3. Speed development of a universally accessible and interoperable digital health platform.
4. Foster awareness and action on a community culture of continuous health improvement.

References

1.Institute of Medicine. 2014. U.S. Health in International Perspective: Shorter Lives, Poorer Health. Washington, DC: The National Academies Press. doi:10.17226/13497.

2.Pearcy, J. N., and K. G. Keppel. 2002. A summary measure of health disparity. Public Health Reports. 117(3):273-280.

3.World Health Organization (WHO). 2001. The World Health Report 2000: Health Systems: Improving Performance. Public Health Reports 116(3):268-269.

4.Davis, K., K. Stremikis, C. Schoen, and D. Squires. 2014. Mirror, Mirror on the Wall, 2014 Update: How the U.S. Health Care System Compares Internationally. The Commonwealth Fund.

5.Squires, D., and C. Anderson. 2015. U.S. Health Care from a Global Perspective: Spending, Use of Services, Prices, and Health in 13 Countries. The Commonwealth Fund.

6.Murray, C. 2013. The State of US Health, 1990-2010: Burden of Diseases, Injuries, and Risk Factors. Journal of the American Medical Association. 310(6):591-606.

7.Halfon, N. and M. Hochstein. 2002. Life course health development: an integrated framework for developing health, policy, and research. Milbank Quarterly 80(3): 433-479.

8.Emanuel, E., N. Tanden, S. Altman, S. Armstrong, D. Berwick, F. deBrantes, M. Calsyn, M. Chernew, J. Colmers, D. Cutler, T. Daschle, P. Egerman, B. Kocher, A. Milstein, E.O. Lee, J.D. Podesta, U. Reinhardt, M. Rosenthal, J. Sharfstein, S. Shortell, A. Stern, P.R. Orszag, and T. Spiro. 2012. A Systemic Approach to Containing Health Care Spending. New England Journal of Medicine.

9.World Health Organization. 2011. Newborn Death and Illness.

10.Centers for Disease Control and Prevention: Infant Mortality. Page last updated: 01/12/2016.

11.Centers for Disease Control and Prevention. 2014. National Center for Health Statistics: Leading Causes of Death.

12.Consumer Federation of America. 2013. Child Poverty, Unintentional Injuries and Foodborne Illnesses: Are Low-Income Children at Risk?

13.Centers for Disease Control and Prevention. 2006. Report: Injury–A Risk at Any Stage of Life.

14.Xu J. Q., S.L. Murphy, K. D. Kochanek, and B. A. Bastian. 2016. Deaths: Final Data for 2013. National Vital statistics Reports.64 (2):1. Hyattsville, MD: National Center for Health Statistics.

15.Fineberg, H.V. 2013. The State of Health in the United States. JAMA. 310(6):585-586.

16.Child Witness to Violence Project-fact sheet. Retrieved online:http://www.childwitnesstoviolence.org/facts--myths.html

17.Child Trends. 2016. Children's Exposure to Violence. Retrieved online: http://www.childtrends.org/?indicators=childrens-exposure-to-violence

18.Institute of Medicine. 2014. New directions in child abuse and neglect research. Washington, DC: The National Academies Press.

19.Wight,V., M. Chau, Y. Aratani. January 2010. Who are America's Poor Children? The Official Story. January 2010. National Center for Children in Poverty. Columbia University.

20.Child Maltreatment. 2015. Forum on Child and Family Statistics. Retrieved online: http://www.childstats.gov/americaschildren/family7.asp

21.Centers for Disease Control and Prevention. 2014. National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States. Atlanta, GA: U.S. Department of Health and Human Services.

22.Center for Behavioral Health Statistics and Quality. 2015. Behavioral health trends in the United States: Results from the 2014 National Survey on Drug Use and Health (HHS Publication No. SMA 15-4927, NSDUH Series H-50). Substance Abuse and Mental Health Services Administration.

23.Wise, P. H.. 2016. Child poverty and the promise of human capacity: childhood as a foundation for healthy aging. Academic pediatrics; 16(3):S37-45.

24.Essex M. J., T. Boyce, C. Hertzman, L. L. Lam, J. M. Armstrong, S. Neumann, and M. S. Kobor. 2013. Epigenetic vestiges of early developmental adversity: childhood stress exposure and DNA methylation in adolescence. Child development;84(1):58-75.

25.Boyce W. T., M. B. Sokolowski, and G. E. Robinson. 2012. Toward a new biology of social adversity. Proceedings of the National Academy of Sciences;109(Supplement 2):17143-8

26.Gawande, A. 2016. Quantity and Quality of Life: Duties of Care in Life-Limiting Illness. JAMA. 315(3):267-269

27.Gordon, L., A. Diaz, C. Soghomonian, A. Nucci-Sack, J. Weiss, H. Strickler, R. Burk, N. Schlecht, and C. Ochner. 2016. Increased Body Mass Index Associated with Increased Risky Sexual Behaviors. Journal of Pediatric Adolescent Gynecoogly. 29(1):42-7.

28.Blum, R. W., and F. Qureshi. 2011. Morbidity and Mortality among Adolescents and Young Adults in the United States: AstraZeneca Fact Sheet.

29.Rudd, R. A., N. Aleshire, J. E. Zibbell, and R. M. Gladden. 2015. Increases in Drug and Opioid Overdose Deaths — United States, 2000–2014. Morbidity and Mortality Weekly Report. 64.50-51 (2016): 1378-382.

30.Newsletter of the Office of National Drug Control Policy. 2010. PsycEXTRA Dataset 1.2: Executive Office of the President.

31.Tanielian, T., and L. H. Jaycox. 2008. Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery. RAND Center for Military Health Policy Report.

32.Centers for Disease Control and Prevention. 2013. The State of Aging and Health in America 2013. Atlanta,GA: Centers for Disease Control and Prevention, U.S. Dept. of Health and Human Services.

33.U.S. Department of Health and Human Services. 2010. Multiple Chronic Conditions—A Strategic Framework: Optimum Health and Quality of Life for Individuals with Multiple Chronic Conditions.

34.Alzheimer's Association. 2015 Alzheimer's Disease Facts and Figures. Alzheimer's & Dementia 2015;11(3)332

35.Reichman, N. E. 2005. Disparities in Low Birth Weight by Race, Ethnicity, and Nativity. School Readiness: Closing Racial and Ethnic Gaps. 15(1).

36.Collins, J. W., R. J. David, A. Handler, S. Wall, and S. Andes. 2004. Very Low Birthweight in African American Infants: The Role of Maternal Exposure to Interpersonal Racial Discrimination. American Journal of Public Health. 94(12): 2132–2138.

37.Braveman, P. 2008. Perspective: Racial Disparities at Birth: The Puzzle Persists. Issues in Science and Technology. 24(2).

38.Centers for Disease Control and Prevention – Asthma Fact Sheet.

39.Anderson, S. E., and R. C. Whitaker. 2009. Prevalence of Obesity Among US Preschool Children in Different Racial and Ethnic Groups. Arch pediatr Adolesc Med. 163(4):344-8.

40.Skinner, A.C., and J. Skelton. 2014. Prevalence and Trends in Obesity and Severe Obesity Among Children in the United States, 1999-2012. JAMA Pediatrics. 168(6):561-566.

41.Freedman, D. S., W. H. Dietz, S. R. Srinivasan, and G. S. Berenson. 2009. Risk Factors and Adult Body Mass Index Among Overweight Children: The Bogalusa Heart Study. Pediatrics. 123(3):750-7

42.Mozaffarian, D, E. J. Benjamin, A. S. Go, D. K. Arnett, M. J. Blaha, M. Cushman, S. de Ferranti, J. P. Després, H. J. Fullerton, V. J. Howard, M. D. Huffman, S. E. Judd, B. M. Kissela, D. T. Lackland, J. H. Lichtman, L. D. Lisabeth, S. Liu, R. H. Mackey, D. B. Matchar, D. K. McGuire, E. R. Mohler, C. S. Moy, P. Muntner, M. E. Mussolino, K. Nasir, R. W. Neumar, G. Nichol, L. Palaniappan, D. K. Pandey, M. J. Reeves, C. J. Rodriguez, P. D. Sorlie, J. Stein, A. Towfighi, T. N. Turan, S. S. Virani, J. Z. Willey, D. Woo, R. W. Yeh, M. B. Turner MB, and the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. 2015. Heart disease and stroke statistics—2015 update: a report from the American Heart Association. Circulation. e29-322.

43.American Cancer Society. 2016. Cancer Facts & Figures for African Americans 2016-2018. Atlanta: American Cancer Society

44.Alzheimer's Association. 2002. Report: African Americans and Alzheimer's Disease: The Silent Epidemic.

45.Centers for Disease Control and Prevention. 2011. QuickStats: Life Expectancy at Birth, by Sex and Race/Ethnicity — United States.

46.McGinnis, J. M., P. Williams-Russo, and J. R. Knickman. 2002. The Case For More Active Policy Attention To Health Promotion. Health Affairs. 21(2)..

47.Halfon, N, K. Larson, M. Lu, E. Tullis, and S. Russ. 2014. Lifecourse Health Development: Past, Present and Future. Journal of Maternal and Child Health. 18(2):344-365

48.Lu, M. C. 2010. We can do better: improving perinatal health in America. Journal of Women's Health. 19(3):569-74

49.Mokdad, A.H., J.S. Marks, D.F. Stroup, and J.L. Gerberding. 2004. Actual Causes of Death in the United States, 2000. JAMA. 291(10):1238-1245.
50.McGinnis, J.M., and W.H. Foege. 1993. Actual causes of death in the United States. JAMA. 270(18):2207-2012.
51.Centers for Disease Control and Prevention. 2014. Press Release: Up to 40 percent of annual deaths from each of five leading US causes are preventable. http://www.cdc.gov/media/releases/2014/p0501-preventable-deaths.html
52.World Bank. 2015. Adolescent fertility rate (births per 1,000 women ages 15-19) from 2011-2015. http://data.worldbank.org/indicator/SP.ADO.TFRT (Accessed July 9, 2016).
53.Mosher, W. D., J. Jones, and J. C. Abma. 2012. Intended and unintended births in the United States: 1982 – 2010. National Health Statistics Reports (55):1-28.
54.Centers for Disease Control and Prevention. 2011. Vital signs: Current cigarette smoking among adults aged > 18 years – United States, 2009-2012. Morbidity and Mortality Weekly Report 60(35):1207 – 1212. Atlanta, GA: CDC.
55.Halfon, N., K. Larson, and S. Russ. 2010. Why Social Determinants. Healthcare Quarterly 14(1):1-8.
56.Braveman, P, S. Egerter, and D. R. Williams. 2011. The Social Determinants of Health: Coming of Age. Annual Review of Public Health. 32:381–98.
57.Hummer, R. A., and E.M. Hernandez. 2013. The Effect of Educational Attainment on Adult Mortality in the United States. Population Bulletin 68(1): 1–16.
58.Zheng, H.. 2012. Do people die from income inequality of a decade ago?. Social Science & Medicine 75(1);36-45.
59.Addy, S., and V.R. Wright. 2012. Basic Facts about Low-income Children, 2010: Children Under 18. New York: National Center for Children in Poverty, Columbia University.
60.Chetty, R., M. Stepner, S. Abraham, S. Lin, B. Scuderi, N. Turner, A. Bergeron, and D. Cutler. 2016. The Association Between Income and Life Expectancy in the United States, 2001-2004. Journal of the American Medical Association 315(16):1750-1766.
61.Lu, M.C. 2010. We can do better: improving perinatal health in America. Journal of Women's Health 19(3): 569-574.
62.McEwen, B.S. 1998. Protective and damaging effects of stress mediators. New England Journal of Medicine 338(3):171–179.
63.Arias, E. 2016. Changes in life expectancy by race and Hispanic origin in the United States, 2013–2014. NCHS data brief, no 244. Hyattsville, MD: National Center for Health Statistics.
64.Frist, B. 2015. Where Health and Environment Converge. 15 April 2015. Forbes. http://www.forbes.com/sites/billfrist/2015/04/15/where-health-and-environment-converge (accessed July 8, 2016).
65.Berwick D.M., T.W. Nolan, and J. Whittington. 2008. The Triple Aim: Care, Health, And Cost. Health Affairs. 27(3):759-769. doi: 10.1377/hlthaff.27.3.759.
66.Daschle, T., P. Domenici, B. Frist, and A. Rivlin. 2013. Prescription for Patient-Centered Care and Cost Containment. New England Journal of Medicine 369(5): 471-474.
67.Health Policy Brief: Care Transitions. 2012. Health Affairs. http://www.healthaffairs.org/ (accessed July 8, 2016)
68.Kasper, E.K., G. Gerstenblith, and G. Hefter. 2002. A Randomized Trial of the Efficacy of Multidisciplinary Care in Heart Failure Outpatients at High Risk of Hospital Readmission. Journal of the American College of Cardiology 39(3):471-480.
69.Hernandez, A. F. 2010. Relationship Between Early Physician Follow-up and 30-Day Readmission Among Medicare Beneficiaries Hospitalized for Heart Failure. Journal of the American Medical Association.
70.Hines, A. L., M. L. Barrett, H. J. Jiang, and C. A. Steiner. 2011. Conditions With the Largest Number of Adult Hospital Readmissions by Payer. AHRQ Statistical Brief.
71.Loeppke, R., M. Taitel, V. Haufle, T. Parry, R. C. Kessler, and K. Jinnett. 2009. Health and Productivity as a Business Strategy: A Multiemployer Study. Journal of Occupational and Environmental Medicine. 51(4) 411-28.
72.Institute of Medicine. 2010. The Healthcare Imperative: Lowering Costs and Improving Outcomes. Workshop Series Summary.
73.Berwick, D.M., and A.D. Hackbarth. 2012. Eliminating Waste in US Health Care. JAMA. 307(14):1513-1516.

74.Parker, G., M. Van Alstyne, and S. Choudary. 2016. Platform Revolution. W.W. New York, NY: Norton & Company.
75.Diaz, A, and N. Manigat. 1999. The Health Care Provider's Role in the Disclosure of Sexual Abuse: The Medical Interview as the Gateway to Disclosure. Children's Health Care. 28(2).
76.Margolis, P. A., L. E. Peterson, and M. Seid. 2013. Collaborative Chronic Care Networks (C3Ns) to transform chronic illness care. Pediatrics 1;131(Supplement 4):S219-23
77.Forrest C. B., P. Margolis, M. Seid, and R. B. Colletti. 2014. PEDSnet: how a prototype pediatric learning health system is being expanded into a national network. Health Affairs 33(7):1171-7.
78.Fineberg, H. V. 2012. From shared decision making to patient-centered decision making. Israel Journal of Health Policy Research.1:6.
79.Frist, B. 2014. Connected Health And The Rise Of The Patient-Consumer. Health Affairs.
80.Gawande, A. 2014. The Hot Spotters. The New Yorke
81.Green, S. R., V. Singh, and W. O'Byrne. 2010. Hope for New Jersey's City Hospitals: The Camden Initiative. Perspectives in Health Information Management. 7(1).
82.Garg, A., M. Marino, A. R. Vikani, and B. Solomon. 2012. Addressing Families' Unmet Social Needs Within Pediatric Primary Care: The Health Leads Model. Clinical Pediatrics. 51: 1191-1193.
83.Meyer, H. A New Care Paradigm Slashes Hospital Use and Nursing Home Stays for the Elderly and the Physically and Mentally Disabled. Health Affairs. 30(3): 412-415.
84.Institute of Medicine. 2006. Food Marketing to Children and Youth: Threat or Opportunity? Washington, DC: The National Academies Press.
85.Lavizzo-Mourey, R. and J. M. McGinnis. 2003. Making the Case for Active Living Communities. American Journal of Public Health. 93(9):1386-1388
86.Inkelas, M., and P. Bowie. 2014. The Magnolia Community Initiative: The Importance of Measurement in Improving Community Well-Being. Community Investments 26(01):18-24.
87.Fineberg, H. V. 2012. A Successful and Sustainable Health System — How to Get There from Here. New England Journal of Medicine. 366(11):1020-7.
88.Halfon N., P. Long, D. I. Chang, J. Hester, M. Inkelas, and A. Rodgers. 2014. Applying a 3.0 transformation framework to guide large-scale health system reform. Health Affairs 33(11):2003-11
89.Frist, B. and T. Daschle. 2015. Advancing Transparency in Healthcare: A Call to Action. The Hill.
90.Daschle, T. 2009. Moving the Focus from Illness to Wellness. Medical Laboratory Observatory.
91.Lavizzo-Mourey, R. Halfway There? Health Reform Starts Now. Journal of the American Medical Association. 315(13):1335-6
92.Daschle, T., P. Domenici, B. Frist, and A. Rivlin. 2013. How to Build a Better Health-Care System. The Washington Post.
93.Berwick D. M. 2016. Era 3 for Medicine and Health Care. Journal of the American Medical Association. 315(13):1329-1330.
94.Lavizzo-Mourey, R. Why We Need To Build a Culture of Health In The United States. Acad Med. 90(7):846-8.

Suggested Citation

McGinnis, J.M., Berwick, D.M., Dascle, T.A., Diaz, A., Fineberg, H.V., Frist, W.H., Gawande, A., Halfon, N., Lavizzo-Mourey, R. 2016. *Systems Strategies for Health throughout the Life Course.* Discussion Paper, Vital Directions for Health and Health Care Series. National Academy of Medicine, Washington, DC. https://nam.edu/wp-content/uploads/2016/09/systems-strategies-for-health-througout-the-life-course.pdf.

Author Information

J. Michael McGinnis, MD, MPP, is Leonard D. Shaeffer Executive Officer, National Academy of Medicine. **Donald M. Berwick, MD,** is President Emeritus and Senior Fellow for the Institute for Healthcare Improvement, and is a former Administrator for Centers for Medicare and Medicaid Services. **The Honorable Thomas A. Daschle,** is Founder and Chairman of The Daschle Group, and is a former United States Senator. **Angela Diaz, MD, MPH,** is Jean C. and James W. Crystal Professor of Adolescent Health, Department of Pediatrics, Department of Preventive Medicine at the Icahn School of Medicine at Mount Sinai. **Harvey V. Fineberg, MD, PhD,** is President, Gordon and Betty Moore Foundation. **The Honorable William H. Frist, MD,** is University Distinguished Professor of Health,

Owen Graduate School of Medicine, Vanderbilt University, and is a former United States Senator. **Atul Gawande, MD, MPH,** is Surgeon, Brigham and Women's Hospital, Professor, Harvard School of Public Health and Harvard Medical School, and is Director, Ariadne Labs. **Neal Halfon, MD, MPH,** is Professor of Pediatrics and Public Health, and is Co-Director, Center for Healthier Children, Families, and Communities, University of California, Los Angeles. **Risa Lavizzo-Mourey, MD, MBA,** is President and CEO, Robert Wood Johnson Foundation.

Acknowledgments

Elizabeth Finkelman, director of the Vital Directions for Health and Health Care Initiative, provided valuable support for this paper.

Sponsors

The Vital Directions for Health and Health Care Initiative is supported in part by the California Health Care Foundation, The John A. Hartford Foundation, the Robert Wood Johnson Foundation, and the National Academy of Medicine's Harvey V. Fineberg Impact Fund.

Disclaimer

The views expressed in this Perspective are those of the authors and not necessarily of the authors' organizations, the National Academy of Medicine (NAM), or the National Academies of Sciences, Engineering, and Medicine (The Academies). The Perspective is intended to help inform and stimulate discussion. It has not been subjected to the review procedures of, nor is it a report of, the NAM or the Academies. Copyright by the National Academy of Sciences. All rights reserved.