

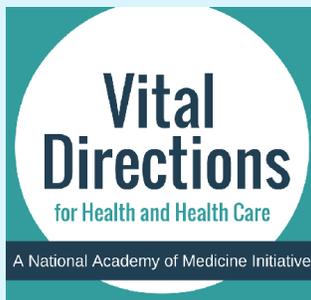
Workforce for 21st Century Health and Health Care

A Vital Direction for Health and Health Care

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About the Vital Directions for Health and Health Care Series



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Introduction

America's health and health care workforce is made up of people in many occupations, generally categorized as clinicians and people in technical and supporting occupations. Health care accounts for one-fifth of jobs in America; according to the Bureau of Labor Statistics, health care occupations will constitute the fastest-growing occupational segment in the next decade, accounting for one-fourth of new jobs (BLS, no date). In this perspective, we do not attempt a quantitative assessment of the size or distribution of the American health and health care workforce or of the numerous studies and projections of workforce supply and demand (American Association of Medical Colleges, no date; US nursing workforce, 2014). Rather, we examine the roles, relationships, and capabilities of today's

health and health care workforce and how they must evolve to serve the needs of the American people better throughout the 21st century.

Today, our health care system is in the midst of a transition from the traditional fee-for-service approach toward value-based models of care delivery. This reformation of care delivery and management is intended to make care more patient-centric and person-centric while reining in health care costs by keeping people healthy, reducing unnecessary treatment and duplication of services, emphasizing smooth continuity of care within and among sites, and improving the alignment between clinical need and delivery site.

In value-based models, health care providers are paid on the basis of keeping healthy patients healthy while caring for and improving the health of those

suffering from acute and chronic illness with cost-effective and evidence-based treatments. Successfully executing those models and achieving the high level of efficiency intended requires not only seamless coordination among care providers but integrated approaches to care centered on the specific needs of individual patients and segments of the patient population that have similar health conditions and characteristics. Health care organizations, assuming the risk for both health outcomes and costs, are increasingly using patient-targeting models (in which the patient population is stratified according to health risk and care use) to deliver efficient and effective care.

It is increasingly clear that the current health care system is not generally organized to serve the many patient subpopulations that exist. Notably, there is neither an operating model nor a financing model that allows a single doctor to discharge adequately and simultaneously the responsibilities of promoting population health, treating major episodes of illness and injury, delivering chronic-disease care optimally, and attending to the special needs of patients at the end of their lives. To deliver efficient and high-quality care, the US health care workforce will need to be organized to be responsive to the needs of individual patients.

To deliver integrated care within these clinical clusters, the US health system will need to recruit, educate, and sustain a diverse health and health care workforce that is comfortable working collaboratively in interdisciplinary teams, is technically skilled, and is adept at harnessing the capabilities of modern health information technology.

In identifying the vital directions for the future of America's health and health care workforce, we examine the vital health and health care needs of broad segments of the American populace with particular attention to characteristics of health status and corresponding health care use:

- People who are generally healthy and experience only intermittent and minor episodes of illness or injury, including those who need maternity and perinatal services for healthy newborns.
- People experiencing acute and major episodes of illness and injury.
- People who have significant chronic medical and behavioral conditions, especially those who have multiple, co-occurring conditions.

- People approaching the end of their natural lifespan who have unique and special health care needs, regardless of their status with respect to a particular diagnosis.

The Population in Good Health: A Workforce to Keep People Healthy and to Promote Population Health

Since 1900, Americans' life expectancy has increased by more than 30 years, more than about three-fourths of which can be attributed to public health (Bunker et al., 1994). In productivity terms, that clearly is an impressive record for public health and prevention and underscores the potential for better health and lower costs. Healthy people consume far less health care than people who are seriously ill or injured. A study published in 2012 determined that half the US population accounts for only 2.7% of annual health care expenditures of \$1.35 trillion (Cohen, 2014). The healthy half of Medicare beneficiaries uses less than 4% of program spending whereas the sickest 5% consume 43% of program spending (CBO, 2005). A recent population-health study in the province of Ontario, Canada, found a similar distribution of use: the health care expenditures of the healthiest 50% of the population accounted for 2.9% of overall spending (Wodchis et al., 2016). Moreover, there was stability of that group: only 3.5% of the group moved into the top 10% of spending in either of the 2 years after the initial study period.

Risks and opportunities are inherent in focusing on the half of the US population that has low health care spending. The "healthy half" is not typically studied, because it does not account for a substantial amount of health care spending per capita, but it does consist of about 162 million people. Promoting and sustaining the health of that group and expanding its size could have dramatic downstream effects on health care spending in the United States (McGinnis et al., 2002). To engage the members of the group and, ideally, to grow their numbers, we need to understand the behavioral, biomedical, social, and environmental factors that result in the greatest health benefit. That will enable us to construct a health workforce capable of developing new and effective ways to promote both individual and population health, discourage harmful behaviors, and deliver cost-effective preventive services (IOM, 2003).

Committing to that vision will require a new way of thinking about how we measure and track health status. If we think about health status as an integration of individual-health data and metrics that track the health of populations, much work will be needed to develop and test evidence-based measures of overall health (IOM, 2015a). The goal is to engage not only individuals but groups and communities in establishing and supporting the services and environments that, early in life, set the stage for long-term health prospects throughout the lifespan (IOM, 2000).

A workforce committed to improving population health will require new roles and expertise outside the traditional boundaries of public health. McGinnis et al. have described the relative contributions of several domains to early mortality in the United States: genetics, 30%; social circumstances, 15%; environmental exposures, 5%; behavioral choices, 40%; and shortfalls in medical care, 10% (McGinnis et al., 2002). A workforce oriented toward health promotion and health protection will need skills in assessing and addressing social determinants of health, will need knowledge of effective prevention strategies, and will need the ability to communicate (using both traditional and nontraditional media) to engage an increasingly skeptical public.

In addition to population-health skills, the workforce will need preventive-medicine skills. The US Preventive Services Task Force (USPSTF) recommends a variety of tests or examinations that can help to set priorities for the efforts of this future workforce (USPSTF, 2002). For example, the USPSTF recommends mammography for women 40 years old and older every 1–2 years. It also recommends a one-time screening for abdominal aortic aneurysm for men 65–75 years old who have ever smoked. Those recommended screening examinations are now covered by most insurance plans without cost sharing (Health policy brief, 2010). The professional roles associated with keeping people healthy and understanding the risks associated with disease will require expertise in a broad array of topics.

The workforce to assume those roles and provide those services will include not only physicians and nurses but public health and community health workers. Public health is labor-intensive work, especially in low-income and disadvantaged communities. Physicians constitute the most expensive type of health care manpower. In the future, the task of health promotion and protection will increasingly use teams of

registered nurses and nurse practitioners, physician assistants, behavioral-health specialists, social workers, informaticists, technologists, pharmacists, nutritionists, and others. New roles may emerge as well. For more than 45 years, Americans have entrusted their prehospital medical care to paramedics and emergency medical technicians, who are remotely supervised by licensed physician medical directors. The day may come when telemedicine-enabled “primary-care technicians” equipped with smart phones or tablet computers work the same way (Kellermann et al., 2013).

Many intermittent illnesses, such as upper respiratory infections, affecting those who are generally healthy are time limited and may be managed by the patient or family with telehealth advice. Locations for accessing services may include the Internet, pharmacy or big-box retail-based clinics, and urgent-care centers in addition to traditional primary care, hospital outpatient clinics, and health departments. Although members of the healthy population are not heavy users of care, ready access to their medical home should be ensured through telehealth, remotely supervised members of the primary care team, or, if required, office visits. Otherwise, delays in care will undermine patients’ confidence in the effectiveness of the health care system and drive them to seek care outside their medical home.

If we want to expand the proportion of the population that remains in good health for the vast majority of their lifespan, we will need to train workforces that are comfortable in working in cooperative teams and at the interfaces of health care, behavioral interventions, social services, and even the justice system. That will require educational pathways and evidence-based practice guidelines to train and support a new generation of health and health care workers—dedicated professionals who are prepared to deliver excellent and affordable preventive care to individuals, families, and entire communities.

The Population That Has Acute Illness or Injury: A Workforce to Care for People Who Experience Major Episodes of Illness or Injury

Despite effective health-promotion and injury-prevention programs, a substantial minority of Americans will continue to experience unexpected serious health events (such as a very premature birth, cancer, or a

serious injury due to a fall or car crash). Others will develop one or more common chronic conditions (such as hypertension) that, if improperly managed or ignored, could progress to cardiovascular disease, stroke, cancer, respiratory disorders, or kidney failure. America's future health and health care workforce will need providers who can manage those problems thoughtfully, skillfully, and compassionately without the fragmentation and discontinuities of care that bedevil many health care encounters today.

Some aspects of medical care can be managed only with complex or technically demanding procedures, so we will always need an adequate supply of highly trained and skilled specialist physicians, nurses, and other expert providers. However, there are worrisome signs of a looming shortage of some specialist physicians and a chronic shortage of registered nurses in primary care. Even now, as our nation's population grows and the baby-boom generation ages, increasing numbers of experienced health care professionals are approaching retirement age. It is not clear how we will replace them with the current nursing-school infrastructure (largely a shortage of nurse educators and insufficient clinical placements) and a fixed number of Medicare-funded graduate medical-education residency positions. As we proceed further into the 21st century, we will confront an aging population and society's growing expectation of a fully functional, longer life. Those trends foreshadow a continuing need for specialty and subspecialty expertise in the care of patients who have acute illness or severe injury. Educating our future workforce to deal with major illness and injury will continue to be a public necessity regardless of possible changes in how workforce training occurs, where it occurs, and who funds it (IOM, 2014).

Several caveats make the projection of specialty and subspecialty manpower highly uncertain. First, and perhaps most important, there will be continuous reengineering of who does what during episodes of acute care. The historical disciplined-centered argument over which specialty is "in charge" will give way to an approach focused on achieving optimal team performance and reproducible results at the lowest cost. That approach will be increasingly important as payment shifts from fee-for-service reimbursement to paying for bundles (episodes) of work, partial or full capitation, and global budgets.

Second, care that was traditionally confined to hospital venues will expand to include the acute and postacute continuum. That is already happening with outpatient surgery and with prehospital performance of electrocardiography and initiation of acute care by paramedics. In the future, posthospital care will also grow and be delivered by visiting nurses and "community paramedicine." Individual episodes of care, such as joint replacements, are already expanding to encompass preparation before hospitalization, acute care, and rehabilitation after hospital discharge. Care redesign will increasingly engage caregivers who were not previously involved in the acute intervention process. It will also sometimes compel judicious and targeted involvement by highly specialized interventionalists. Those changes will necessarily affect undergraduate and graduate medical and nursing education and increase the importance of training in interdisciplinary practice.

Third, regionalization of care, in which health care institutions within a defined geographic area are centrally organized and managed, may reduce the number of interventional specialists that are needed. If regional health systems and state-based trauma-care and emergency-care networks start to funnel their most challenging cases to a smaller number of high-performing centers, the result may be the high procedural volumes needed to produce more consistent high-quality outcomes than currently occur in many densely served and highly competitive markets (IOM, 2010).

Finally, the relationship between those who give and those who receive care, even in acute-care settings, will evolve as patients become more active participants in their health care. That will affect not only how care is provided but who provides it. It may also influence how much care is deemed worthwhile (not only by providers but by patients and their families). As standardized outcome data become more publicly available and better understood by patients and purchasers, the choice of providers will increasingly be driven by objective information about quality and price rather than by a vague sense of "reputation." That will also require the availability of those who will be able to translate applications of the information and tools for direct personal management of care choice and processes.

All those societal and technologic changes will put pressure on the regulatory and self-regulatory (disciplined-based) structures that until now have effectively maintained the status quo. Regulatory-policy change may be necessary to facilitate needed progress in care delivery. With so many intersecting forces in play, estimating future manpower needs will be a dynamic and ever-more-complex task. We remain convinced, however, that caring for others will continue to be an extraordinarily popular and well-regarded component of our social and economic enterprise.

The Population That Has Chronic Disease and Multiple Comorbidities: A Workforce to Serve People Who Have Chronic Medical or Behavioral Conditions

This group includes people who have medical conditions that are not curable but can be treated for and managed so that they can lead productive lives with reasonable hope of normal life expectancy. It includes those who live in a chronic state of difficult life circumstances caused by low income, poor education, unstable housing, food deprivation, obesity, mobility restrictions, and substance abuse.

Although the future “chronic-condition” workforce will have much in common with the workforce that focuses on health promotion, those who focus on chronic-disease care will be expected to develop sustained relationships with chronic-disease patients and family caregivers even in the absence of acute illness or injury. Those relationships matter because patients and family caregivers are essential partners in the caregiving team.

The cases of patients who have chronic conditions are inherently complex. That is particularly true of those who have multiple health problems, those who have comorbid behavioral health issues (mental health or substance-abuse conditions), and those whose conditions are compounded by adverse health determinants. Management of complexity often requires the collective expertise of a team of problem solvers that are attuned to the social, physical, and economic conditions in which their patients live. To meet the needs of the growing number of patients who have multiple chronic conditions or behavioral health issues, we need a health care workforce that looks and behaves differently from the current one and is linked and

integrated by team skills, communication strategies, and technology tools in a much more effective fashion.

In 2010, half the US noninstitutionalized adult population had at least one chronic condition, and half of these had two or more chronic conditions (Ward and Schiller, 2013). In 2012, one-tenth of adults said that they felt sad, and one-sixth had felt nervous or restless in the preceding 30 days; these rates were doubled or worse in poor people (Blackwell and Clark, 2014). People who have chronic disease compounded by behavioral health problems are more expensive to treat, and the poor and uninsured are more likely to have both. Having multiple chronic conditions reduces quality of life, but having a comorbid behavioral disorder lowers it substantially more (Mujica-Mota et al., 2015). Many people have demonstrated that outcomes are better if management of physical and behavioral conditions is integrated and care is delivered by a multidisciplinary team (Bodenheimer et al., 2009; Mujica-Mota et al., 2015). Capacity to manage the growth in complex care while holding costs down depends on the development of multidisciplinary teams capable of delivering comprehensive care, particularly in primary care settings (Bodenheimer et al., 2009; Sinsky et al., 2013).

Those findings have important implications for educating health professionals to provide care for our nation’s neediest consumers. First, they must be educated interprofessionally to have the skills needed to work effectively in teams and practice collaboratively (Reeves et al., 2013). Accordingly, health professionals in training must have frequent and reinforcing experiences with learners in the other health professions. That is the only practical way to prepare doctors, nurses, and other health professionals to work effectively in teams to deliver the care that patients who have chronic diseases need. Second, those experiences must be less hospital based and instead based more in the community to align with the needs of patients (IOM, 1989, 2014). Training should also be longitudinal and immersive. Third, health-workforce education needs to become more efficient and flexible. Regulations should allow individualization of training, interprofessional teaching, and multidisciplinary supervision to model a future built around collaborative care. In the future, interdisciplinary teams should have these features:

- Continuity should be provided through teams rather than reliance only on individual physicians or nurse practitioners. Within interdisciplinary teams, some members will forge sustained healing relationships with patients, and others will provide episodic support (Leleu and Minvielle, 2013). Information technology will enhance continuity and ensure timely access.
- Work should be distributed on the basis of the skills of the team members. Interdisciplinary teams should ensure a broad scope of practice and provide care in all settings, including patients' homes (Bazemore et al., 2015; Mattke et al., 2015). That means having the best person perform specific tasks, adding more team members when needed, and changing the roles of others (Bodenheimer and Sinsky, 2014).
- Case management should be targeted. The multidisciplinary teams will incorporate staff members who track patients' health care visits and social-service contacts. They will ensure smooth transitions of care from home to hospital and back again, and they will monitor fragile patients closely by using telehealth-enabled community health workers, primary care technicians, and others who come from the communities that they serve (Kangovi et al., 2014; Kellermann et al., 2013). Recruiting team members who have relevant cultural, linguistic, and interpersonal skills will help teams to foster alliances with the patients, families, and communities that they serve. For that reason, the health care workforce of the future must be more diverse and culturally competent than the current one.

Complex patients require the talents and expertise of many who are interconnected to work as one team of problem solvers who not only manage patients' medical conditions but address behavioral health and poor social conditions. Being organized in this way will help the team to improve care for individuals, achieve better health for populations, and lower the cost of care (Berwick et al., 2008).

The Population Facing Death and Dying: A Workforce to Care for People at the End of Life

Sooner or later, each of us faces the reality of death as an inescapable part of the human experience.

In the United States, the number of elderly people who have comorbidities, frailties, and co-occurring physical and cognitive disabilities is growing rapidly (IOM, 2015b). Yet many patients who have incurable conditions either have not considered or are unprepared to make decisions about their end-of-life care options. While the education and training of palliative-care and hospice-care professionals have improved greatly in the last 2 decades, the number of these specialists has remained small, so many patients receive their end-of-life care from other clinicians—typically those who treat advanced illness but lack specialized training in hospice and palliative care (IOM, 2015b). Policies that facilitate the education of providers who work with patients about their end-of-life options and are skilled in delivering palliative medicine and hospice care would offer an important source of comfort and support for patients and loved ones near the end of life.

Recommended Vital Directions

As the US health care system transitions to value-based models of care, health care organizations are increasingly turning to population-stratification approaches to deliver care that is targeted, effective, and efficient. The United States will need a workforce that is responsive to that reformation of care delivery and management and that is organized and trained to address the needs not only of individual patients but of specific segments of the patient population. On the basis of our assessment of the health and health care needs of four critical patient populations—those in good health, those who are facing acute illness and injury, those who have chronic diseases and multiple comorbidities, and those at the end of life—we offer the following vital directions for the future health care workforce.

1. Assess and ensure the sufficiency of the front-line health care workforce. American health policy must continue to support a growing health care workforce devoted to keeping people healthy and to promoting population health. The ideal workforce to fulfill this mandate is diverse—geographically, racially, ethnically, and religiously—and multidisciplinary. It consists of physicians, physician assistants, registered nurses, social workers, nutritionists, exercise physiologists, and public health and other health professionals.

Organized into multidisciplinary teams, these professionals can use technology to reengineer health care delivery, enhance community-based health practices, extend the reach of clinicians, and increase access to care, particularly in isolated and rural communities. With expanded access to telehealth applications, the healthy population would no longer be constrained to receiving needed services at fixed sites of practice. People who experience minor episodes of illness or injury and who do not require a clinical procedure or access to expensive diagnostic and treatment technology could be managed more conveniently and less expensively close to home. Examples of telehealth services in Arkansas and New Mexico have demonstrated that patients need not travel long distances to achieve optimal primary care outcomes (Arora et al., 2007; Lowery et al., 2014).

2. Ensure an acute-care workforce that can provide timely accessibility. The health care workforce serving patients who experience major episodes of illness and injury must reconstitute and reorganize to achieve better outcomes at lower cost. Serving patients who experience major episodes of illness and injury is expensive. It involves clinicians who have received many years of expensive education and training. Often, the care of such patients involves expensive technology, medicines, and long periods of treatment and recovery.

Reconstitution and reorganization of this segment of the health care workforce should aim to foster the regionalization and better targeting of these services. There is abundant evidence that in treatment of patients who have malignancies, stroke, or cardiac conditions, demonstrable value is associated with bringing patients to the right place at the right time for the right reason quickly and efficiently. Regionalization of care will ensure that this segment of the health care workforce is serving enough patients to sustain skills, achieve optimal outcomes, and support high-quality training programs (IOM, 2010).

3. Develop the clinical and social service teams required to manage high-need chronic conditions. The health care workforce serving patients who live with chronic medical and behavioral conditions must be interdisciplinary and team based and be organized around the unique needs and life circumstances of

individual patients. Health care professionals serving patients who have chronic medical conditions encounter a more difficult medical-management challenge when the patients live in poverty or have mental health comorbidity. Chronic illness is also more complicated to treat when associated with obesity, substance abuse, or physical disability. Chronic-care management and individual life circumstances are inextricably linked. To serve patients effectively and to achieve optimal health outcomes, the workforce must have the collective education, skills, and capacity to help patients to live with their chronic conditions.

Diverse, interdisciplinary workforce teams that include community health workers, primary care technicians, and other occupational groups are needed for the effective health management of patients who have complex chronic diseases. Ideally, the teams would be characterized by high levels of integration, continuing engagement with patients and family caregivers in the absence of acute episodes, and adoption of home monitoring technologies to prevent expensive hospital admissions and avoidable visits to the emergency department. Practice-support services, in the model of the US Department of Agriculture Cooperative Extension, could facilitate team-based care, and related demonstrations are under way (Bielaszka-DuVernay, 2011; Phillips et al., 2013), as exemplified by the HERO program developed by the University of New Mexico's Health Sciences Center.

4. Train the caregiver workforce so important at the end of life. America needs to make a "human" investment in health and health care professionals who serve patients at the end of their natural lifespan.

About 3 million Americans die each year. For too long we have attempted to serve the end-of-life care needs of patients as an extension of the workforce that provides care for those who have advanced illness. Training and supporting more palliative-care and hospice-care professionals would reduce our reliance on health care professionals whose skills and talents are best suited to caring for those who are suffering from acute or advanced illness or chronic disease. With added capacity in palliative care and hospice care, America can provide people with the end-of-life experience that each person desires, more often in a home or other noninstitutional setting.

Summary Recommendations for Vital Directions

1. Assess and ensure the sufficiency of the front-line health care workforce.
2. Ensure an acute care workforce that can provide timely accessibility.
3. Develop the clinical and social service teams required to manage high-need chronic conditions.
4. Train the caregiver workforce so important at the end of life.

References

- Arora, S., K. Thornton, S. M. Jenkusky, B. Parish, and J. V. Scaletti. 2007. Project ECHO: Linking university specialists with rural and prison-based clinicians to improve care for people with chronic hepatitis C in New Mexico. *Public Health Reports* 122(Suppl 2):74-77.
- Association of American Medical Colleges. No date. The complexities of physician supply and demand: Projections from 2014 to 2025. Available at http://www.aamc.org/download/458082/data/2016_complexities_of_supply_and_demand_projections.pdf (accessed June 14, 2016).
- Bazemore, A., S. Petterson, L. E. Peterson, and R. L. Phillips. 2015. More comprehensive care among family physicians is associated with lower costs and fewer hospitalizations. *Annals of Family Medicine* 13(3):206-213.
- Berwick, D. M., T. W. Nolan, and J. Whittington. 2008. The triple aim: Care, health, and cost. *Health Affairs* 27(3):759-769.
- Bielaszka-DuVernay, C. 2011. Vermont's blueprint for medical homes, community health teams, and better health at lower cost. *Health Affairs* 30(3):383-386.
- Blackwell, D. L., J. W. Lucas, and T. C. Clarke. 2014. Summary health statistics for U.S. adults: National Health Interview Survey, 2012. In *Statistics*, Vol. 10. Washington, DC: National Center for Health Statistics.
- BLS (US Bureau of Labor Statistics). No date. *Healthcare occupations: Occupational outlook handbook: U.S. Bureau of Labor Statistics*. Available at <http://www.bls.gov/ooh/healthcare/mobile/home.htm> (accessed June 14, 2016).
- Bodenheimer, T., and C. Sinsky. 2014. From triple to quadruple aim: Care of the patient requires care of the provider. *Annals of Family Medicine* 12(6):573-576.
- Bodenheimer, T., E. Chen, and H. D. Bennett. 2009. Confronting the growing burden of chronic disease: Can the U.S. health care workforce do the job? *Health Affairs* 28(1):64-74.
- Bunker, J. P., H. S. Frazier, and F. Mosteller. 1994. Improving health: Measuring the effects of medical care. *The Milbank Quarterly* 72:225-258.
- CBO (Congressional Budget Office). 2005. *High-Cost Medicare Beneficiaries*. Washington, DC: Congressional Budget Office. <https://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/63xx/doc6332/05-03-medispending.pdf>.
- Cohen, S. B. 2014, October. The Concentration of Health Expenditures and Related Expenses for Costly Medical Conditions, 2012. Statistical Brief 455, Medical Expenditure Panel Survey. Rockville, MD: AHRQ. Available at https://www.meps.ahrq.gov/mepsweb/data_files/publications/st455/stat455.pdf (accessed August 22, 2016).
- Health policy brief: Preventive services without cost sharing. 2010. *Health Affairs*. Available at http://www.healthaffairs.org/healthpolicybriefs/brief_pdfs/healthpolicybrief_37.pdf.
- IOM (Institute of Medicine). 1989. *Primary care physicians: Financing their graduate medical education in ambulatory settings*. Washington, DC: National Academy Press.
- IOM. 2000. *Promoting health: Intervention strategies from social and behavioral research*. Washington, DC: National Academy Press.

- IOM. 2003. *Who will keep the public healthy: Educating public health professionals for the 21st century*. Washington, DC: The National Academies Press.
- IOM. 2010. *Regionalizing emergency care: Workshop summary*. Washington, DC: The National Academies Press.
- IOM. 2014. *Graduate Medical Education That Meets the Nation's Health Needs*. Washington, DC: The National Academies Press. doi: 10.17226/18754.
- IOM. 2015a. *Vital signs: Core metrics for health and health care progress*. Washington, DC: The National Academies Press.
- IOM. 2015b. *Dying in America: Improving quality and honoring individual preferences near the end of life*. Washington, DC: The National Academies Press. doi: 10.17226/18748.
- Kangovi, S., N. Mitra, D. Grande, M.L. White, S. McCollum, J. Sellman, R.P. Shannon, and J.A. Long. 2014. Patient-centered community health worker intervention to improve posthospital outcomes: A randomized clinical trial. *JAMA Internal Medicine* 174(4):535-543.
- Kellermann, A. L., J. Saultz, A. Mehrotra, S. S. Jones, and S. Dalal. 2013. Primary care technicians: A solution to the primary care workforce gap. *Health Affairs* 32(11):1893-1898.
- Leleu, H., and E. Minvielle. 2013. Relationship between longitudinal continuity of primary care and likelihood of death: Analysis of national insurance data. *PLoS One* 8(8):e71669.
- Lowery, C. L., J. M. Bronstein, T. L. Benton, and D. A. Fletcher. 2014. Distributing medical expertise: The evolution and impact of telemedicine in Arkansas. *Health Affairs* 33(2):235-243.
- Mattke, S., D. Han, A. Wilks, and E. Sloss. 2015. Medicare home visit program associated with fewer hospital and nursing home admissions, increased office visits. *Health Affairs* 34(12):2138-2146.
- McGinnis, J. M., P. Williams-Russo, and J. R. Knickman. 2002. The case for more active policy attention to health promotion. *Health Affairs* 21:78-93.
- Mujica-Mota, R. E., M. Roberts, G. Abel, M. Elliott, G. Lyratzopoulos, M. Roland, and J. Campbell. 2015. Common patterns of morbidity and multi-morbidity and their impact on health-related quality of life: Evidence from a national survey. *Quality of Life Research* 24(4):909-918.
- Phillips, R. L., A. Kaufman, J. W. Mold, K. Grumbach, M. Vetter-Smith, A. Berry, and B. Teevan Burke. 2013. The Primary Care Extension Program: A catalyst for change. *Annals of Family Medicine* 11(2):173-178.
- Reeves, S., L. Perrier, J. Goldman, D. Freeth, and M. Zwarenstein. 2013. Interprofessional education: Effects on professional practice and healthcare outcomes (update). *Cochrane Database of Systematic Reviews* 2013(3).
- Sinsky, C. A., R. Willard-Grace, A. M. Schutzbank, T. A. Sinsky, D. Margolius, and T. Bodenheimer. 2013. In search of joy in practice: A report of 23 high-functioning primary care practices. *Annals of Family Medicine* 11(3):272-278.
- The U.S. Nursing Workforce: Trends in Supply and Education—results in brief. 2014. *American Nurse Today* 9(6) <https://www.americannursetoday.com/the-u-s-nursing-workforce-trends-in-supply-and-education-results-in-brief/> (accessed June 14, 2016).
- USPSTF (US Preventive Services Task Force). 2016, February. USPSTF A and B recommendations. Available at <http://www.uspreventiveservicestaskforce.org/Page/Name/uspsty-a-and--b-recommendations/> (accessed June 14, 2016).
- Ward, B. W., and J. S. Schiller. 2013. Prevalence of multiple chronic conditions among US adults: Estimates from the National Health Interview Survey, 2010. *Preventing Chronic Disease* 10:E65.
- Wodchis, W. P., P. C. Austin, and D. A. Henry. 2016. A 3-year study of high-cost users of health care. *Canadian Medical Association Journal* 188(3). doi: 10.1503/cmaj.150064.

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