ADM 506 – Final Project - PopH, Systems Coordination, Evaluation
Impacting Society's Health System Determinants

Spring 2020

The changing landscape of health and health care in the United States has fueled an expansion in focus from solely individual care toward population health management. This shift is driven by many factors, including greater attention to quality of patient care, patient safety, and the rapidly increasing cost of health care. Increased awareness of the limitations of US health care, including less than ideal national health outcomes and a growing consensus that the status quo in US health care is unsustainable has helped expand the conversation from the health of individuals to the health of populations. Many key health issues facing the United States-chronic disease, obesity, disability, and behavioral health issues-are particularly well addressed through a population health focus. Finally, there is growing recognition of the acute need to address the many determinants of population health that fall outside of the health care arena.

Population health adopts a broader perspective than traditional medical care in that it extends the traditional 1:1 individual focus of medical care to a group, community, or population and encompasses health care delivery, public health, prevention, wellness and health promotion efforts, community engagement and resources, and health policy efforts. Population health, both as a concept and a field of study, is undergoing considerable evolution and growth and is garnering increased attention from the traditional health care delivery sectors in the United States. Several factors have contributed to this new focus, including shifting health care reimbursement to alternative payment models, from volume care (fee-for-service) to value-based care, and heightened attention given to measuring quality outcomes in health. Factors reinforcing the increased focus include the Institute for Healthcare Improvement's Triple Aim goals of improved patient experience of care, improved health of populations, and reduced per capita cost of health care and the movement toward new models of care delivery, such as those supported by implementation of the Affordable Care Act (ACA).

The increased emphasis on population health is supporting a growing number of initiatives focused on collaborative efforts among health care delivery, public health, and the community. Greater attention is being given to the impact of social and behavioral determinants on population health, and medical schools are beginning to include population health content in the curriculum for their medical students.

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Defining Aspects and Characteristics

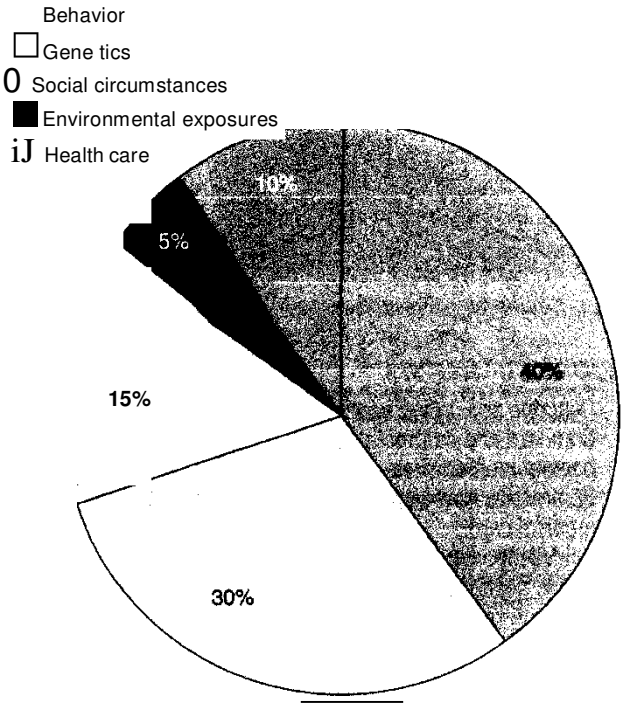
Population health is most commonly defined as "the health outcomes of a group of individuals, including the distribution of health outcomes within the group:' [3] The National Academy of Medicine Roundtable on Population Health Improvement further elaborates on this definition: "while not part of the definition itself, it is understood that such population health outcomes are the product of multiple determinants of health." Population health extends beyond the individual patient focus of traditional medical care and encompasses health outcomes of groups, communities, or populations of individuals. Individuals are members of a variety of populations, communities, or groups, and collectively individual health constitutes the health of populations. US population health is the health of the nation as a whole, including members of various subpopulations, communities, and groups.

Populations may be defined in multiple ways. Examples of defined populations include individuals in a specific geo- graphic area or community, patient panels in an account- able care organization (ACO) or patient-centered medical home (PCMH), individuals with a certain ethnicity, patients with a specific medical condition such as diabetes mellitus or cardiovascular disease in a medical practice, employees of a certain organization, or individuals in a certain health insurance plan. Populations may be viewed and designated from the perspectives of many different stakeholders includ- ing physicians, other members of the clinical team, hospitals, public health workers or organizations, community liai- sons, administrators, employers, and insurers. Public health, which is discussed further later in the chapter, has tradition- ally defined populations within communities and specific geographic areas. Physicians and others in the health care setting may typically define populations within a designated clinical setting or as members of an alternative payment model such as an ACO.

Population health is composed of four major pillars: chronic care management, quality and safety, public health, and health policy.[5] Population health encompasses a broad set of initiatives including the engagement of multiple stakeholders in the areas of prevention and health pro- motion, health care delivery, medical intervention, public health, and policy. Population health is strongly focused on analysis of outcomes to drive process change and new policy.[5] Chronic care management, quality, and safety are activities that have historically been primarily delivered within health care settings but increasingly extend into community locations. Public health has traditionally focused on the community setting. Health policy efforts work to influence change in both health care delivery and community settings.

The overall measure of the health of populations results from the interplay of **determinants of health,** which are the multiple factors that influence an individual's health and health of populations. Determinants can be characterized as behavior, genetics, social circumstances, environmental exposures, and health care categories, as indicated in Fig. 10.1

Historically, initiatives and programs provided through the US public health system have been designed to address behavioral, social, and environmental determinants of



Determinants of population health. (From Schroeder SA. Shattuck Lecture. We can do better-improving the health of the American people. *N Engl J Med.* 2007;357(12):1221-1228. Adapted from McGinnis JM, Williams-Russo P, Knickman JR. The case for more active policy attention to health promotion. Health Aff [Millwood]. 2002;21 [2]:78-93.)

health. The health care system has concentrated on providing disease-based diagnosis, care, and treatment, and while it has also worked to address the other determinants of health, its historic focus on these areas has generally not been robust. It is noteworthy that only 10 percent of the determinants of population health are attributed to medical care, yet medical care is the predominant focus in the health arena in the United States. The vast majority of population health determinants fall into the realm of behavior or lifestyle choices, social circumstances, and environmental exposures. Improving US population health will necessitate broad, prolonged, and determined change and collaboration across multiple stakeholders.

Determinants of Population Health

As discussed earlier, the multiple factors that influence an individual's health and the health of populations are collectively called the *determinants of health* and include the following: behavior, genetics (also called biologic), social, environmental, and health care.[7] Examples of genetic or biologic determinants are age, gender, and inherited health conditions. Behavioral determinants of health include smoking, risk-taking behaviors, exercise, and nutrition. Social determinants include income, social support, and education. Physical and environmental determinants include the natural environment, such as green spaces, as well as the built environment, housing quality, conditions, and exposures. Health care determinants include the availability of quality health care, access, and health insurance. Health outcomes are a complex interplay between the varied health determinants at the individual and population levels.

A significant focus on social determinants of health and their influence on population health has followed the recognition that health begins where people live, work, play, and age..[8,10] The social environment, physical environment, and health care services all contribute to "the social patterning of health, disease, and illness:'[9] They are recognized to interact with and influence behavior and contribute substantially to differences in health outcomes between groups of people.[9]

Healthy People 2020, a national initiative focused on promoting health for all, has identified five key areas to target improved health. These include economic stability; education; social and community context; health and health care; and the neighborhood and built environment.[9] Examples of unique determinants in these categories, outlined by Healthy People 2020 include the following:

1. **Economic stability: poverty, food security, employment**
2. **Education: quality of education, rate of high school graduation, secondary education, early childhood education and development**
3. **Social and community context: civic participation and sense of community, perceptions of discrimination and equity, incarceration**
4. **Health and health care: access to health care and insurance, health literacy, prescription coverage**
5. **Neighborhood and built environment: access to healthy foods and areas to exercise, quality of housing, crime and violence**

Historically, the health care system has focused on those determinants that are associated with disease processes and with activities that are influenced by systems of care. As dis cussed earlier, this is a relatively small portion of all determinants that influence population health, accounting for only 10 percent of overall health.[7]

Population health recognizes that an individual's health status is linked to his or her home, work, school, and other environments, and not just determined by his or her interactions with the health care system. New strategies are needed to improve the health of populations, working beyond the health care setting, with enhanced collaboration with community organizations and public health initiatives. For example, immunization pro- grams in the schools help to avoid challenges with health care access, transportation, or the ability to take time away from work for appointments. The goal is to work collaboratively to support positive change in the places in which people live, work, and learn, thereby promoting the ability to live healthy lives.

As an example, consider a 21-year-old woman with insulin-dependent diabetes. She has been hospitalized six times in the preceding 6 weeks with diabetic event (markedly elevated blood sugars causing acid buildup in the blood). The patient is homeless, cannot afford her food or insulin, and has no transportation to get her to regularly scheduled health care appointments. Without addressing the social determinants-her lack of housing, her food insecurity, and her lack of transportation-her diabetes cannot be treated adequately.

C. Public Health

Public health is defined as "What we as a society do collectively to assure the conditions in which people can be healthy."Public health is a long-standing discipline that has focused on the health of entire populations, communities, states, countries, and even regions of the world. Public health agencies exist at the federal, state, local, and tribal levels, although primary responsibility rests at the state and local levels. Important public health fundamentals include prevention of disease, promotion of health, protection against environmental hazards, disaster preparedness, and assurance of health care quality and accessibility.[12] Public health traditionally has not been focused on individual medical care and private sector health care delivery.

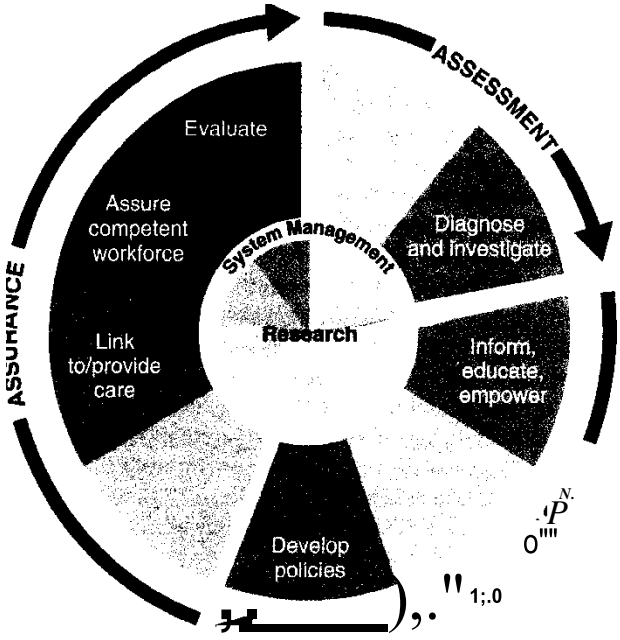
Public health has three core functions and ten essential services (Fig. 10.2). In its assessment function, public health agencies monitor health status to identify and solve community health problems and diagnose and investigate health problems and hazards in the community. An example is the use of the Behavioral Risk Factor Surveillance Sys- tem (BRFSS) data to determine state-based prevalence of chronic disease.[13] Another example is the investigation of community infectious disease outbreaks such as measles. In its policy development function, public health informs, educates, and empowers individuals about health and health issues; mobilizes community partnerships to identify and solve community health challenges; and develops policies and plans in support of individual and community health efforts.

Examples include media campaigns and community outreach targeted at disease prevention and health promotion opportunities such as tobacco use, immunizations, chronic disease, and involvement in policy development for mandatory reporting of certain disease conditions or smoke-free environments. In its assurance function, public health enforces laws and regulations that protect health; links individuals to health services when otherwise unavailable; and evaluates effectiveness, accessibility, and quality of person- and population-based health services. An example is the provision of health care services for vulnerable populations such as immunization or infant formula programs. Research is a central component of public health that allows the study and development of innovative solutions to health problems.

The five core disciplines of public health are:

1) epidemiology and 2) biostatistics, both of which provide the basis for the assessment function of public health; 3) environ- mental health sciences and 4) social and behavioral sciences, both of which help inform the assessment and policy development functions of public health; and 5) health policy and management, which integrates with the assurance function of public health. Public health is additionally dependent on the biomedical sciences to apply fundamental concepts to public health issues such as chronic disease and prevention. Public health systems exist to safeguard the health and well-being of the community. Federal, state, and local governments assume many responsibilities needed to protect public health. The network of public health agencies is extensive and includes public, private, and voluntary entities[12] (Fig. 10.3).

2) Important data sources are available for information on community health including the BRFSS[13] and County Health Rankings and Road maps[15] as well as individual state and county-level public health data. In addition, state and county health assessment and improvement plans, hospital and county **community health needs assessments (CHNAs),**



Public health core functions and essential services. (From Centers for Disease Control and Prevention, Office for State, Local, Tribal, and Territorial Support. NPHPS Overview.)

and the Healthy People 2020 objectives and progress tracker all provide measures of public health.

Population Health, Public Health, and Population Medicine

Population health is built on important public health fundamentals, particularly disease prevention and health promotion. *Public health* is one of the four pillars of population health,[5] and the core disciplines and competencies of public health are important elements of population health management.

Public health actively monitors community health status, investigates health problems, develops programs and initiatives focused on health, develops policy, and engages in research for better community health. Public health is programmatically focused on health promotion and disease prevention and is primarily community-based.[1,2,14] The public health system involves "all public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction:'[12]

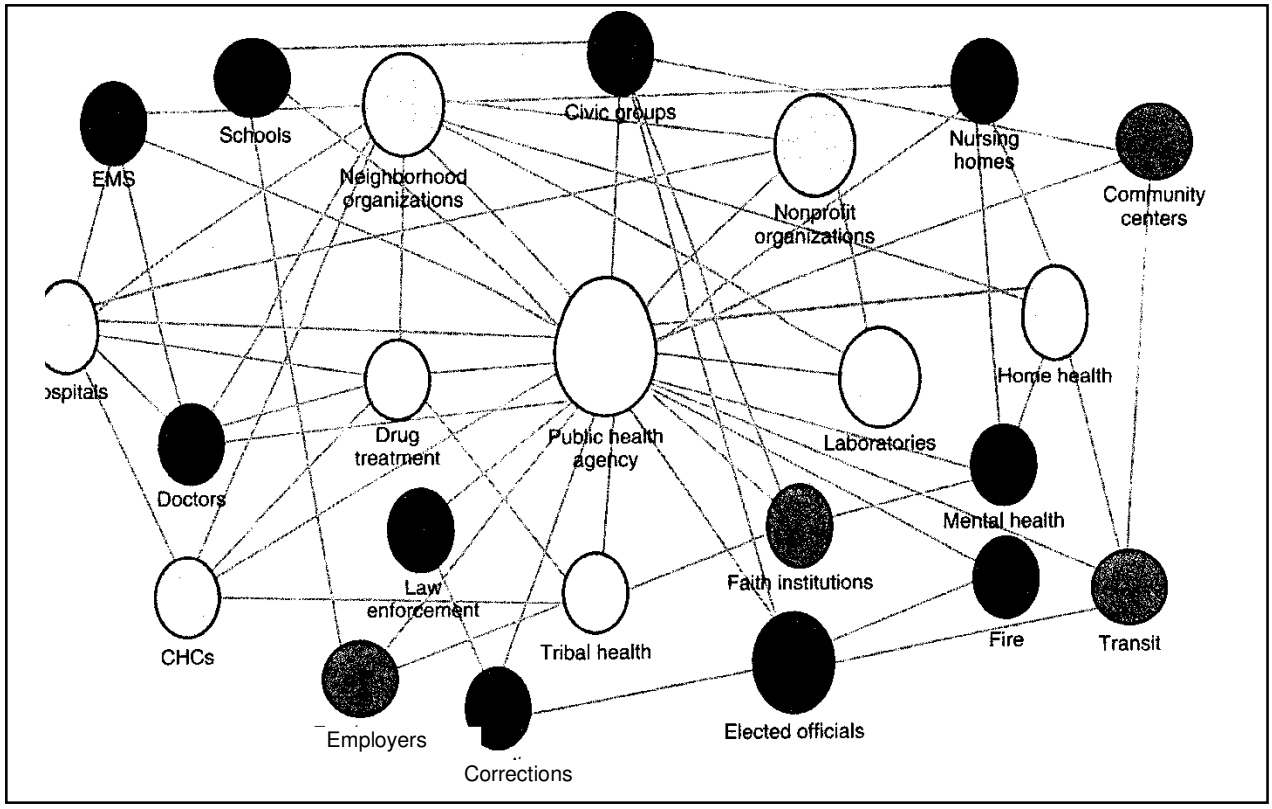
Population health reaches more broadly into the delivery arena and encompasses health promotion, disease prevention, and engagement of multiple stakeholders in the areas of prevention, health care delivery, medical intervention, public health, and policy.[5] In addition, population health is less directly connected to government health departments.[16]

With advancement of new models of care and reimbursement, population health in hospitals, clinics, and other health care delivery sites is increasingly focused on designated populations of patients. Increased use of data, process change, and extended interdisciplinary clinical teams characterize a new population focus. An emerging term in the area of population health is *population medicine,* defined as "the design, delivery, coordination, and payment of high- quality health care services to manage the Triple Aim for a population using the best resources we have available within the health care system:"[17] While population health is emphasized in this chapter, knowledge and understanding of the terms *population health, public health,* and *population medicine* will be important in a rapidly evolving health care system (Table 10.1). The approach to a medical condition such as diabetes helps to portray the differences but also the synergies within population health, public health, and population medicine. In a medical clinic, broader use of information technology and an extended health care team help support a population medicine focus. Data for a panel of diabetic patients including pertinent laboratory results (e.g., Hemoglobin A1C), frequency of routine office visits, visits to the emergency department or hospitalization, and maintenance of preventive care can be aggregated and analyzed. In an effort to improve population health of the (patient) panel, these data can be used to risk-stratify patients into high/ medium/low risk, to highlight needed process change in the clinic (if applicable), and to assign higher-risk patients to care management professionals.

From a public health perspective, county, state, and federal data is assessed and used by public health officers to establish the prevalence of chronic diseases, including diabetes, in a community. Diabetes is an example of a prevalent chronic disease that has been a top health priority for public health. Public health performs many activities including the following:

- Routine collection of epidemiologic data on diabetes mellitus
- Creation of workgroups in the community to assess needs and barriers
- Development of community initiatives and events focused on wellness, nutrition, and physical activity
- Provision of community resources for diabetes education and services
- Development of guidelines and toolkits for school and worksite wellness and nutrition
- Provision of health services for vulnerable populations
- Establishment of goals to reduce the disease burden of diabetes.

Health of populations and overall US population health are the result of outcomes and initiatives across health care delivery and public health through prevention and promotion efforts, a focus on broad determinants of health, a reduction of disparities and inequity, and, ultimately, engagement of individuals and patients themselves. Many opportunities exist for integration of health care delivery and public health efforts to support robust improvement in the health of designated populations and overall US population health. As evidenced by Fig. 10.3, public health has an extensive net- work and many developed and long-standing relationships at the community level. As discussed in the example earlier in the chapter, public health performs significant activities in the community. Greater connection between medical care and community resources and available data provides the opportunity for support of individual patient needs and population health. This connection also provides the opportunity for more tailored focus utilizing expertise from both medical and public health arenas. Examples of ongoing initiative: **bridging medical care, public health, and the community for improved population health.**



The public health system. (From Centers for Disease Control and Prevention. Office for State, Local, Tribal and Territorial Support. NPHPS Overview.)

A. Limitations in US Health and Health Care

A number of significant limitations in US health care must be overcome in order to achieve improved population health. These include the following:

A focus on sick care over prevention and wellness. Clinical training has traditionally emphasized acute illness and chronic disease care over prevention and wellness. The fee-for-service reimbursement system has been more heavily based on acute care and procedures.[24] Prevention, chronic disease management, nutrition, and behavioral health have been traditionally undervalued and reimbursed at a rate less than acute care. Preventive services for patients are also generally more difficult than access to acute care in the United States, with some speculating that one contributing reason may be more medical school graduates entering specialties rather than primary care.[25] In addition, the public health sector with its focus on prevention and health promotion has been relatively underfunded when compared with acute care reimbursement[26] and has not been well integrated with medical care.[27]

Siloed and fragmented efforts for health and health care. Health care is often organized and prioritized around the health care delivery system rather than the patient. Patients typically must initiate contact and access many different points in order to receive their health care.

Lack of coordination, integration, and communication between different points of a patient's care all contribute to fragmentation of the health care system. Frequent changes in a patient's insurance coverage or changes in provider networks for insurance companies car also contribute to fragmentation, as patients may need to access new health care providers based on requirement of their current insurance coverage.[28] Connection between medical care, public health, and community resources for patients to support their health and he and health care have been limited.[16]

Inadequate assimilation and use of data. Communication sharing information between the various parties involved in care of a patient is often limited. Barriers to greater communication and coordination of care include interoperability of electronic health records (EHRs) and limitation in capability for health information exchange. For data that are available, clear delineation of information needed, goals for data analysis, and data analysis itself is often inadequate and inconsistent. Medical care and public health data sources are not well connected.2

Suboptimal patient engagement. Lack of defined teams for patient care, lack of tools, and time constraints on an individual provider impact the achievement of greater patient engagement in their health care. Patient centeredness and shared decision making, as well as the methods to operationalize these concepts in a busy clinical practice, have typically not been robust areas of emphasis in clinical training. Patient education and resources and tools are often inadequate.

Inequality and inequity in health and health outcomes: Where people live; their socioeconomic status and their race ethnicity, gender, age, sexual orientation and disability status have historically impacted health and health outcomes. Comprehensive solution.to address the impact of the social determinants of health on health outcomes have been difficult to develop. Root causes are often

Comparison of Population Health, Public Health and Population Medicine

	"The health outcomes of a group of individuals, including the distribution of such outcomes within the group	• Public health • Population medicine • Prevention and health promotion • Community engagement and resources • Health policy
Public health	"What we as a society do collectively to assure the conditions in which people can be healthy.	Assessment • Monitor community health status • Diagnose and investigate community health problems and hazards Policy development • Inform, educate, and empower community about health and health issues • Mobilize community partnerships to identify and solve health issues • Develop policies focused on health Assurance • Enforce laws and regulations that protect health • Link individuals to health services • Ensure a competent public health workforce • Evaluate community public health services[12]
Population medicine	"The design, delivery, coordination, and payment of high-quality health care services to manage the Triple Aim for a population using the best resources we have available within the health care system"[17]	• Health care delivery • New models of care and alternative payment models • Extended care teams • Health information technology

complex, and policy, funding, and support targeted at these areas has not been robust.[31]

Reimbursement systems, incentives, education, and culture that support the status quo. A fee-for-service reimbursement system often reinforces fragmented efforts as individual providers are paid separately for their part of a patient's care. Accountability, reimbursement based on quality, and care coordination have not characterized traditional fee-for-service systems. Finally, as discussed earlier, incentives are often misaligned in health care as acute care and procedures are reimbursed at a greater rate than preventive care. This is accentuated by the training of medical students, residents, and other health care professionals in hospitals where sick care is most often provided.

Outcomes of these limitations are significant from a clinical, cost, and population health perspective. Among other challenges, there is a significant prevalence of chronic dis- ease (including diabetes, hypertension, and cardiovascular disease), obesity, an aging population, and dysfunction in behavioral health care with high cost and comparatively poor overall population health as compared to almost all developed countries.

Chronic diseases, long-lasting conditions that can be controlled but not cured, are the most common health conditions and the most costly. Fifty percent of US adults have one or more chronic diseases, increasing to 80 percent for those older than 65 years of age.[32] Nine out of 10 of the leading causes of death in 2010 were due to a chronic disease or generally associated with patients with chronic disease.[33]

The growing obesity epidemic in the United States is an important factor in health status. Thirty-eight percent of adults in the United States are obese. Seventeen percent of children and adolescents are obese.[34] Obesity is associated with significant comorbidities including cardiovascular dis- ease, hypertension, Type II diabetes mellitus, and cancer.[35] Evidence is accumulating of cardiovascular damage in obese children.[36]

An aging population also presents the United States with significant health issues, including chronic disease, falls, polypharmacy, diminished quality of life, dependency, and disability[1,4] Fifty percent of those older than 65 years of age have two or more chronic diseases.[19] Falls are a significant cause of morbidity, dependency, and diminished quality of life.[37] By 2030, one in five individuals in the United States will be an older adult.[38] The impact of mental health on physical health has received increased attention.[39,40] Twenty-five percent of adults in the United States experience mental illness, with 1 in 17 having a serious mental illness. Mood disorders are the third leading cause of hospitalization in those 18 to 44 years of age. Those with serious mental illness are at increased risk for chronic disease.[41] National health care expenditures were 17.9 percent of the gross domestic product (GDP) in 2011. The breakdown of expenditures included 31.5 percent spent on hospital care, 20 percent on physician and clinical services, and 9.7 percent on prescription medications. [42] Eighty-six percent of health care costs are attributed to treating chronic disease.[43]

In a global comparison, the United States spends the highest percent- age of GDP on health care by far. However, in comparison to countries of similar income, the United States lags on key outcome measures including life expectancy and prevalence of chronic disease.[4,44,45]

Optimal disease management necessitates coordinated care along with use and exchange of data and patient engagement. In addition, health care providers must have greater knowledge of and connection with the resources outside of the health care system, including those resources in the public health sector and the community where individuals spend the majority of their time. Finally, in order to optimize the health of a population, there needs to be a much greater focus on and support for prevention. All of these areas are limitations in the current US health care system. The overall impact is relatively poor population health in the United States, and comparatively poor population health in relation to countries of similar income globally.

B. Health Disparities

A fundamental health care question is "Why are some Americans healthier than others?" The answer is complex. Differences in health and health outcomes between groups of people are considered **health disparities.** There are a number of proposed definitions for *health disparities* or *health inequalities,* terms often used interchangeably and the definition applied is often related to the context in which it is used.

Healthy People 2020 defines a health disparity as "a particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion. These differences are significantly influenced by social determinants of health at the individual and population levels and the associated differences in the allocation of resources. These differences are often considered avoidable, unjust, or unfair and sometimes referred to as *health inequities.*
Sadly, there are innumerous examples of health disparities in the United States. In Chicago, Ill, the difference in life expectancy is 16 years when comparing the Washington Park neighborhood on the South Side, which is predominantly African-American, and the Loop in the city center just 5 miles away, which is predominantly white.[48] Nationally, infant mortality remains highest for non-His- panic black women.[49] Diabetes prevalence is highest among males, individuals 65 years of age and older, non-Hispanic blacks and those of mixed race, Hispanics, individuals with less than a high school education, those who are poor, and those with a disability[4.9] These disparities often relate to complex interactions of social, economic, environmental, and systemic factors, making it difficult to design readily applicable solutions. In addition, the absence of disease does not necessarily denote health. For example, there remain differences in an individual's ability to lead a healthy lifestyle and avoid disease. In 2011, 30 percent of people did not have close access to stores with healthy foods.[49] The combined cost of health inequalities and premature deaths in the United States between 2003 and 2006 was estimated to be $1.24 trillion. Ultimately, health and health care efforts aim to achieve health equity (or the state in which all individuals achieve their full health potential). As the cause for health disparities is complex, the solution to eliminate avoidable disparities is also complex. This requires a collaborative effort with policy makers, national initiatives focused on health promotion, research on health outcomes and disparities, the health care system, public health, social services, and community programs.

Population health can play an important role in analyzing these disparities and associated social determinants of health at the local, community, and national level to identify trends and associated solutions. In addition, contributing to ongoing population health research efforts, including community engagement designs such as translational research and community-based participatory research, is important.

Health care organizations can collaborate with community residents and organizations to define health priorities for communities through CHNAs. A CHNA is a "process that uses quantitative and qualitative methods to systematically collect and analyze data to understand health within a specific community. The data can inform community decision making, the prioritization of health problems, and the development, implementation, and evaluation of community health improvement plans: Innovative health care delivery models focusing on value, using enhanced technology, and incorporating team-based approaches are key new initiatives with promise to improve population health. National initiatives, such as Healthy People 2020, the National Partnership for Action to End Health Disparities sponsored by the Office of Minority Health within the US Department of Health and Human Services, and the National Institutes of Health Centers for Population Health and Health Disparities are important because they further inform health policy and legislation designed to eliminate health disparities and lead to improved population health.

C. Health Care Delivery

Prior to the passage of the ACA in 2010, health care delivery focused primarily on the care of individual patients. With recent implementation of new payment and delivery models, such as accountable care organizations, physicians and other health care providers are expected to manage individual patients, but are also increasingly responsible for managing populations of patients.[52]

In earlier times, when a physician saw a patient with diabetes mellitus, several things may have occurred. They would likely prescribe medication to control the patient's blood sugar, ensure that the patient had influenza and pneumonia vaccines, ensure that the patient saw an ophthalmologist for eye care and a podiatrist for foot care, and check laboratory values, such as Hemoglobin A1C, every 3 to 6 months. The physician was likely focused solely on ensuring that the individual patient received the recommended care.

Increasingly, in this new era of being accountable for patient populations, physicians and health care professionals would still perform the activities listed in the previous paragraph. However, a team of health care providers, potentially including physicians and/or nurse practitioners, physician assistants, nurse care managers, patient navigators, and pharmacists, would analyze the team's patient panel (the "population") to ensure that all those on the panel were receiving this care; that Hemoglobin AlC values are at goal; that all are seeing an ophthalmologist; and that all are getting influenza vaccines. In addition to helping the individual patients, these teams might also institute system changes that would better serve the panel, such as checklists, new protocols, and outreach via new types of health care team members. As previously defined, population health is "the health outcomes of a group of individuals, including the distribution of such outcomes within the group:'[3•53] In the first example, only individual medical care was considered the responsibility of the provider and the health care system. Drawing on population health definition, another fundamental change in health care delivery in the era of population health is focusing on the non-biologic determinants that affect health and managing those as well. These non-biologic determinants are diverse and may include an individual's or population's access to health care, their behaviors, the social environment, and the physical environment.

Following our early example, a patient with diabetes may present to a physician's office with a Hemoglobin AlC that is markedly elevated. That same patient may not have seen an ophthalmologist for 2 or 3 years. In the health care system of the past, the patient would likely have had his or her diabetic medications increased and been counseled on the importance of having an eye examination. Those same things may occur today in the new era of population health. However, in addition, a physician or health care professional may also inquire about a patient's access to healthy food ("Does the patient live in a food desert?"); his or her ability to exercise (".Are there safe areas for a patient to exercise?" "Are there parks around the patient's home?"); and his or her access to transportation for an eye examination.

Optimizing population health means moving beyond traditional thinking and the confines of medical practice to address the other factors that influence health, and consider solutions and resources in order to effectively manage the health of individual patients and populations.

Regulation and Legislation Driving Change

The Triple Aim of improved patient experience, improved health of populations, and lowered per capita cost has focused attention on key outcome goals for US health care delivery. The ACA-instituted new models of care and alternative payment models are focused on and responsive to these goals. Through these models, the 1:1 medical care focus is being broadened to include a population health focus that includes population health management.

Increased access, insurance regulation, cost-containment, quality improvement, improvement in public health and prevention, and research support are all components of the ACA and are areas intended to enhance US health and health care. New models of care, alternative payment models, and programs that impact traditional fee-for-service reimbursement fall in the realm of cost-containment and quality improvement. These include ACOs, PCMHs, bundled payments, value-based purchasing, the Hospital Readmission Reduction Program, and the Hospital Acquired Condition Reduction Program. Although not a new model or program that directly impacts care or reimbursement, the ACA requirement for a CHNA is included because of its contribution to broadening the population health focus.

An ACO is an integrated system of health care professionals/organizations in a formal agreement with a payer to care for a defined patient population. The ACO is account- able for quality, cost, and outcomes of its population of patients.[54] This accountability has prompted ACOs to focus on a number of areas including process improvement, judicious use of data, transitions of care, and optimal patient follow-up. Thirty-three ACO quality metrics exist for Medicare inclusive of metrics for at-risk populations.[55] Financial risk differs among different models of ACOs, with the Pioneer ACOs at higher risk than Medicare Shared Savings Plans (MSSPs). ACOs may be accountable for losses and repayment to Medicare if patient care expenditures exceed set bench- marks.[56] With higher risk comes greater accountability and attention to improving the health and health outcomes for individual patients and the patient population. Recent Centers for Medicare & Medicaid Services data from 2014 indicate improved quality and lowered costs for the MSSPs and Pioneer ACOs.[57]

The PCMH is a model of primary care that provides comprehensive, team-based, patient-centered,

coordinated, accessible care that is focused on quality and patient safety. PCMHs are additionally focused on patient engagement in self-management, utilization of community support and resources, and population health management. [58] PCMHs may undergo accreditation through various accrediting bodies. PCMHs may be part of shared savings models. Patient-centered specialty practices have received recent recognition, although implementation and support has been slow.[59,60] The patient-centered medical neighborhood (Fig. 10.4) is a framework to further enhance PCMHs by linking primary care, specialty care, health care delivery sites, public health, and community resources. However, Population Health challenges exist with reimbursement, robust health information technology, and the overall fragmentation of the health care system.

Bundled payments are set payments for services rendered during a patient's episode of care (course of treatment for a certain medical condition or illness). The clinicians and hospital are accountable for the quality and cost, encouraging care coordination. An example of an episode of care that may fall under a bundled payment arrangement is a total knee arthroplasty. It is important to consider that process improvement, greater care coordination, and enhanced quality impact not only the individual patient, but also the population of patients that may experience the particular episode of care.

In value-based purchasing, hospitals are eligible for a value-based incentive payment, measured by clinical processes of care, patient experience, and outcomes.[63] Value- based purchasing has forced hospitals to analyze their processes, patient satisfaction with their care experience, and overall quality and outcomes. Hospital performance data has been made publicly available on the *Hospital Compare* web- site. Enhancing these outcome measures not only benefits the individual patient but also the population of patients that access care in the hospital.

The Hospital Readmission Reduction Program penalizes hospitals for relatively higher Medicare re-admissions. Fiscal year 2015 penalties applied to acute myocardial infarction, heart failure, pneumonia, chronic obstructive pulmonary disease, and hip/knee arthroplasty. Hospitals have had to analyze process, quality, and transitions of care as part of their efforts to reduce re-admission penalties. These improvements not only benefit the individual patient but also the population of patients that may be hospitalized for these clinical conditions.

The Hospital Acquired Condition Reduction Program reduces Medicare payment to the poorest performing hospitals. Included has been assessment of central-line- associated blood stream infections and catheter-associated urinary tract infections. Hospitals have adopted the best evidence for prevention and focused on quality improvement in efforts to reduce hospital-acquired condition penalties. Again, these improvements not only benefit the individual patient but also the population of patients that may experience these procedures as part of their hospitalization.

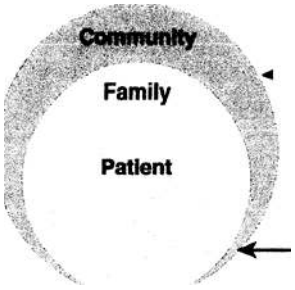
Not-for-profit hospitals are required to perform a CHNA and develop an implementation plan every 3 years in order to keep their 50l(c)(3} status.[54] This requirement is an additional change that has introduced a population health focus into the medical care arena. Some hospitals are working collaboratively with local public health agencies on CHNAs and solutions.

New models of care and alternative payment models have made a significant contribution to the paradigm shift toward population health. Data collection, analysis, and research on the success of these programs are ongoing to determine the most effective interventions to improve population health.

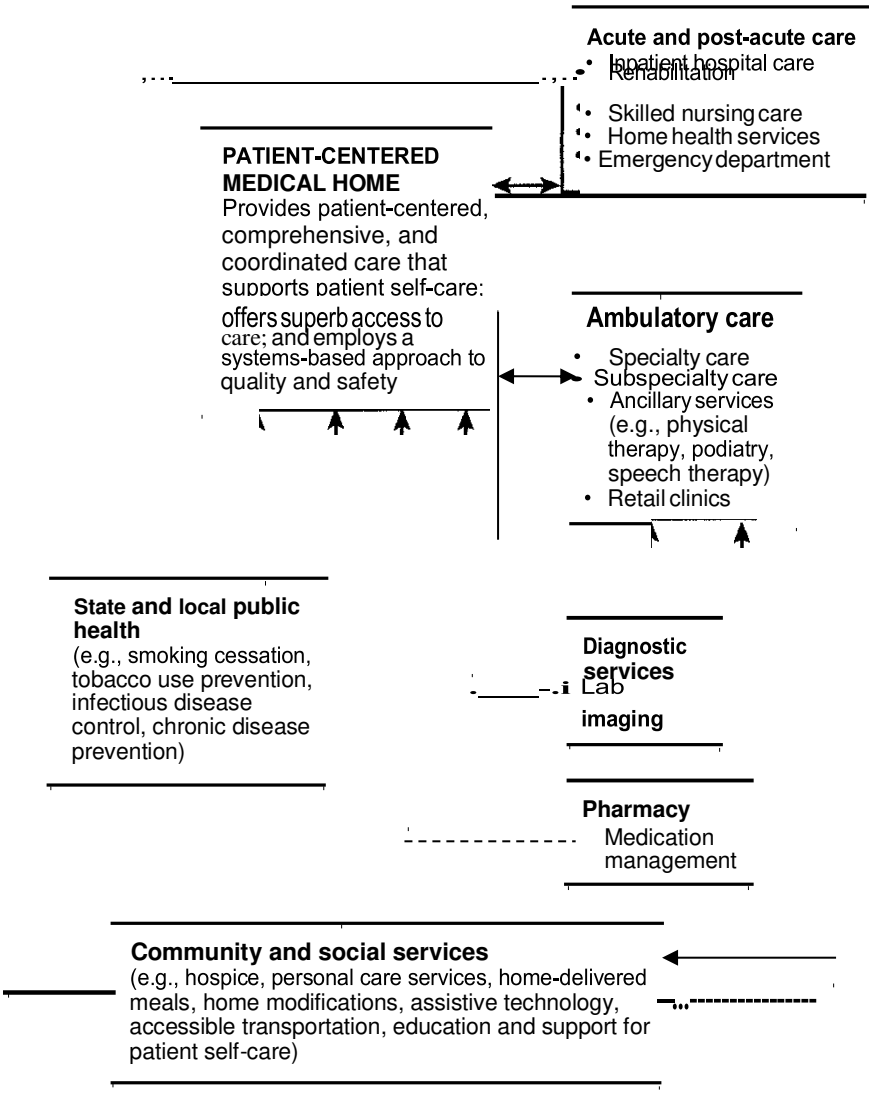
New Tools Supporting Population Health

In addition to new models of care and alternative payment models, new technology is also being introduced to help manage a population's health. These tools include the following:

- **EHRs**
- **Analytic software**
- **Patient portals**
- **Wearable devices and biosensors**
- **Telemedicine**



The patient-centered medical neighborhood. (From Taylor EF, Lake T, Nysenbaum J,



Peterson G, Meyers D. *Coordinating Care in the Medical Neighborhood: Critical Components and Available Mechanisms.* AHRQ Publication No. 11-0064. Rockville, MD: Agency for Healthcare Research and Quality. June 2011.)

1. Electronic Health Records

According to the US Department of Health and Human Services, EHRs "are built to go beyond standard clinical data collected in a provider's office and are inclusive of a broader view of a patient's care. EHRs contain information from all the clinicians involved in a patient's care, and all authorized clinicians involved in a patient's care can access the information to provide care to that patient. EHRs also share information with other health care providers, such as laboratories and specialists. EHRs follow patients-to the specialist, the hospital, the nursing home, or even across the country.

An EHR potentially allows timely, efficient access to large sets of population data, such as Hemoglobin Ale readings for populations of diabetic patients; blood pressure readings for populations of hypertensive patients; and cholesterol data for populations of patients with lipid disorders. Access to this data allows individual providers, medical practices, and health care systems to analyze how well clinicians are managing both acute and chronic dis- ease processes.

While an EHR allows for timely and efficient access to data, there are limitations. Many EHR systems do not communicate with each other, limiting the generalizability of data to settings outside of the population the EHR is serving. In addition, EHRs may not contain retrievable data on the non-biologic determinants that affect health (such as socioeconomic status), and thus a complete picture of a population's health status may not be achievable solely through use of an HER.

2. Analytic Software

The use of analytics to manage populations of patients is becoming increasingly prevalent. In order to use analytics effectively to manage populations, systems must have access to data that do the following:

Integrate data from multiple health sources, across the continuum of care, including from EHRs, but also from mobile applications, wearable technology, and other data sources from which a patient may interact.

Develop and then integrate clinical risk algorithms into the care of patients and populations to ensure that those who need treatment receive it and those who do not need treatment are not over-treated.

Deliver the analysis of data to those who must act on it, such as health care administrators, who must allocate resources based on population need; providers, who must act on their data to improve the clinical care of patients and populations; and individual members within the population, who can use the data to advocate for their own health care needs.

Patient Portals

A patient portal is "a secure website that can interface with an EHR. It serves as a 24/7 access point for patients and can provide two-way communications between patients and practices, including providers, care teams, and administrative staff:[70] Patients can typically access the following through a portal:

- Summaries of recent physician visits
- Hospital discharge summaries
- Medications
- Immunizations
- Allergies
- Laboratory results

Depending on the patient portal, patients may also be able to schedule physician visits, e-mail their physician with non-urgent questions about their health, and request prescription refills.[71]

Patient portals may benefit both health care providers and patients. Health care providers and patients may e-mail each other with non-urgent questions, decreasing the need for phone calls. Patients have access to their health care record and can check to ensure that medications and refills are correct. In addition, patient portals have the potential to improve population health. Portals are designed to allow easier, more direct communication between the patient and provider. For example, if a medicine needs to be adjusted for better diabetes or blood pressure control, a provider may simply e-mail a patient through the portal, instead of trying to track down the patient by phone or making the patient come in for an office visit.

Wearable Devices and Biosensors

Wearable technology can be defined as "mobile electronic devices that can be unobtrusively embedded in the user's outfit as part of the clothing or an accessory:'[72] Wearable technology allows for monitoring of factors influencing an individual's health including monitoring of vital signs (such as heart rate and blood pressure) and number of steps an individual has taken. The information gathered from this wearable technology then can be integrated with other health care data to manage the health of an individual or a population more effectively.

One recent example of wearable technology is Google Glass, which currently may affect patient care more through its adoption by providers than by patients. Google Glass is wearable technology, placed on an individual's face as a set of eyeglasses would be. Google Glass is voice- control enabled to record both audio and video. Among its different functionalities, Google Glass allows surgeons to record their surgery from a first-person perspective, allowing for the teaching of a procedure to a multitude of learners. Google Glass also allows for remote consultations (e.g., by transmitting an image of a rash to a remote dermatologist).[73]

There are other examples of how population health may be improved by wearable technology. Patients may be encouraged to reduce their salt intake and have their blood pressure measured by a wearable, with the results automatically transmitted to the patient's primary health care professional. Wearables may also be employed to measure patients' weight, blood pressure, and pulse to assess the effectiveness of population health campaigns to encourage exercise.

Telemedicine

According to the American Academy of Family Physicians, "Telemedicine is the use of medical information that is exchanged from one site to another through electronic communications. It includes varying types of processes and services intended to enrich the delivery of medical care and improve the health status of patients.'[74]

Examples of telemedicine include the following:

A dermatologist in a remote setting providing care to a patient in a rural setting through an internet connection to examine a newly developed rash; or the broader use of telemedicine for dermatological screenings of populations of farmers with a history of sun exposure

A patient admitted to an intensive care unit at a rural hospital being monitored remotely by a team of physicians and nurses

A panel of diabetic patients monitoring their blood sugars at home and uploading their blood sugars to an endocrinologist, who will then adjust insulin doses to improve Hemoglobin A1C values across a population

Telemedicine is expected to expand exponentially in the next several decades as technology improves, populations age, and the prevalence of chronic disease increases.

New Types of Health Care Workers

The health care system of the 21st century still requires the knowledge and skills of traditional health care providers, including physicians, nurses, and pharmacists. However, as health care becomes increasingly complex and health care providers are asked to manage both individual patients and populations, other interdisciplinary health care providers with new knowledge and skills are required. These new types of health care professionals include the following:

- Nurse care managers
- Community health workers
- Patient navigators

Nurse Care Managers

Nurse care managers coordinate and organize clinical care around individual patients as well as populations of patients.75 Nurse care managers may perform some or all of the following tasks:

- Act as a conduit between the patient and physician.
- Answer patient questions.
- Assist in managing chronic medical conditions.
- Facilitate the transfer of information among a patient's providers, including specialty physicians.
- Conduct home or hospital visits.

Nurse care managers often serve as a bridge between patients and their physicians and health care professionals in primary care or specialty practice. For example, in a busy primary care practice, a primary care provider may have only 15 minutes to spend with a patient who has multiple chronic medical issues, such as diabetes mellitus, chronic obstructive pulmonary disease (COPD), and hypertension. A nurse care manager may reach out in between office visits to ensure that this patient's blood sugars are controlled, that the patient has oxygen for his or her COPD, and that the patient is taking blood pressure medications.

Community Health Workers

The American Public Health Association defines a community health worker as "a frontline public health worker who is a trusted member of and/or has an unusually close under- standing of the community served:'[76] Community health workers are located not only in the United States, but also worldwide. Their role is typically adapted to the needs of the community they serve. For example, a community health worker in an urban location in the United States may pro- vide counseling around sexually transmitted diseases or pro- vide directly observed therapy for tuberculosis. The role of community health workers is expanding to integration into hospital and clinic health care teams.[77]

Patient Navigators

A patient navigator is defined as "a member of the health care team who helps patients 'navigate' the health care sys- tem and get timely care. Navigators help coordinate patient care, connect patients with resources, and help patients understand the health care system:'[78] Patient navigators are often found in physician offices and help navigate patients through one or more chronic health care conditions, such as diabetes or cancer. Some medical schools now train early medical students to serve as patient navigators to gain an understanding of the health care system prior to taking care of patients.[79]

The roles of a patient navigator and a community health worker overlap to some extent. However, for the purposes of this text, a patient navigator does not necessarily need to be a trusted member of the community in order to serve a population. There are many other types of health care providers who contribute to the care of individual patients and populations, including physicians, nurses, nurse practitioners, physician assistants, diabetic educators, pharmacists, dentists, social workers, and medical assistants.

Population Health Initiatives

Camden Coalition Healthcare

Providers

Camden, New Jersey, is a city located across from Philadelphia, Pennsylvania, and the Delaware River runs between the two very different cities. Camden has the highest rate of crime of any city in the United States and is one of the poorest cities in the United States, with over one-third of its population living below the poverty line. The Camden Coalition of Healthcare Providers is a prime example of a local organization integrating public health, clinical medicine, and the community in a poor, urban area.

The Camden Coalition of Healthcare Providers led by Jeffrey Brenner, MD, is a nonprofit "citywide coalition of hospitals, primary care providers, and community representatives that collaborate to deliver better health care to the most vulnerable citizens:'

At the center of the Coalition's work is "hot-spotting This is a data-driven process in which the highest utilizers of health care resources are identified (for example, in many communities, as few as 10 percent of hospital patients account for 75 percent of health care spending). The Coalition uses insurance data to identify these high health care utilizers. Once these patients are identified, resources are mobilized. These resources include a care management team, composed of multiple health care professionals, including social workers, nurses, community health workers, and others who visit the patient both while in the hospital and once discharged, to help reduce re-admissions to the hospital and maximize health.

Homeless Patient Aligned Care Teams

An example of a national initiative integrating population health into clinical medicine is the Homeless Patient Aligned Care Teams (H-PACTs). H-PACTs are being implemented nationally at Veterans Administration (VA) medical centers. The goal of

the H-PACTs is to end veteran homelessness in this high-risk population.
H-PACTs are located on the campus of VA medical centers. H-PACTs integrate many health care profession- als including physicians, nurses, social workers, behavioral health specialists, and substance abuse counselors. This team provides services to homeless veterans, including helping find permanent housing. Patients can also receive medical care through H-PACTs as well as a warm shower and clean clothes if needed. One of H-PACTs' main tenets is that improving health goes beyond medical care. H-PACTs espouse the idea that providing safe, stable housing is pro- viding health care.

While the data analyzing H-PACT outcomes are pending, preliminary results demonstrate that patients enrolled in an H-PACT are hospitalized and use the emergency department less than patients who are not enrolled. This decrease in hospital utilization translates to a savings for the VA system of about $5 million per year.

Million Hearts

The goal of the Million Hearts initiative is to prevent 1 mil- lion heart attacks and strokes by 2017. The targeted focus is to optimize medical care in delivery sites through aspirin use, blood pressure control, cholesterol management, and smoking cessation within a framework of health technology and tools and innovation in health care delivery. The targeted focus is also on changing the environment for smoking, sodium intake, and trans fat intakes.
Million Hearts has extensive partners from the public and private health care sectors, inclusive of federal agencies, state departments of health, national specialty- and disease- focused associations, health care systems, physician groups, local associations, and payers. Ihe partnership has extended to 100 Congregations for Million Hearts. This faith-based program includes congregations that have committed to strengthen relationships with community resources including community health centers and community health workers for their members.
Through Million Hearts, a significant number of proto- cols, guides, and tools have been made available for clinicians, patients, public health workers, and employers to focus on control of hypertension and cardiovascular health. Collaborations are bringing together public health and medical care surrounding cardiovascular health and prevention.

The Future of Population Health

Population health is growing and evolving. A number of new initiatives set the tone for this growth to accelerate and to continue to impact medical care. The US Department of Health and Human Services has been increasingly focused on payment for quality over quantity. Goals have been set to tie certain percentages of traditional payments from Medicare to new payment models such as ACOs or bundled payments and tie all Medicare payments to quality or value through value-based purchasing or the Hospital Readmission Reduction Program.85 The Health Care Payment Learning and Action Network was created to bring together public and private payers to delineate best practices in this arena.86 Hospital providers in an industry consortium, the Health Care Transformation Task Force, have committed to 75 percent of their business operating in value-based payment arrangements by 2020.87 A next generation ACO model that is higher risk than any current ACO is in the pilot stages. For the first time, mandatory bundled payments are required for hip and knee replacement surgeries in certain geographic areas. Increased accountability and financial risk are accelerating focus in medical care on optimizing quality, cost, outcomes, and health for individual patients and populations of patients.
Significant work is ongoing through the State Innovation Models (SIM) initiative to test state-led multi-payer health care delivery and payment models. This is inclusive of work focused on collaborative efforts between primary care, public health, community organizations, and social services. Maryland's all-payer global budget model has shown early success. This model provides a framework for movement forward toward integration of local health care delivery and public health initiatives.

The American College of Cardiology bill created a population health committee. Their goals include focus on primary prevention, health promotion, greater collaboration with primary care, and greater attention to the behavioral and social determinants of health. This is a significant **Population Health** paradigm shift for a specialty group that has been historically procedure-based rather than focused on prevention and population health.

From the community perspective, Accountable Communities for Health are being tested. Particular focus is being paid to determinants of population health and integration of health care, public health, and social services.

Significant opportunity *exists* for collaborative efforts between medical care and public health activities. The siloed nature of these disciplines as well as different sources of funding and reimbursement have been barriers. However, ongoing initiatives such as the Camden Coalition of Healthcare Providers, Homeless Patient Aligned Care Teams, and Mil- lion Hearts are bridging health care delivery, public health, and the community. The ACA has supported assessment and connection to community resources through new models of care and other requirements. Outcomes of SIMs are expected to provide insight into ways to support health care delivery- public health collaborations.

Despite these encouraging efforts, there is still much work to do. A population health focus in medical care needs to expand to all specialties and sites of care. *As* noted earlier, health care is deemed responsible for only 10 percent of the determinants of population health, yet health care garners the most attention and financial support. The health care delivery-public health collaboration needs to become much more comprehensive so resources, attention to prevention, and health promotion, and data are shared more effectively. Attention and action to address the determinants of population health and their root causes, particularly behavior, social circumstances, and environmental exposures, needs to be much more robust. Population health will face greatest improvement in the future with the broad acceptance of responsibility beyond one sector or one determinant, and with multi-stakeholder engagement and collaboration.

Population health as a concept and field is gaining significant momentum due to policy, regulatory change, research funding, and multi-stakeholder engagement through collaborative initiatives at the national, state, community, public health, and medical care levels. The population health agenda is aligned with the goals of the Triple Aim, new models of care, and alternative payment models with a population health focus. National and local population health initiatives and the Center for Medicare and Medicaid Innovation funding are establishing new models that can be disseminated and emulated more broadly. Integration of population health content into health professions curriculum is producing a new generation of health care professionals ready to employ the principles of population health to improve the health of our communities.

Much work still remains, but current efforts are creating a foundation for both a focus on population health and a means for improvement of population health in the United States.

Case Study

Mr. Reed is a 66-year-old African-American male with Type II diabetes mellitus whose blood sugar control has not been optimal. Additionally, he is overweight and is not physically active. His primary care physician (PCP) has had multiple discussions with Mr. Reed about the importance of good blood sugar control, optimal weight, and regular exercise. The PCP has discussed concerns about the development of comorbidities, particularly coronary artery disease. Mr. Reed has been referred to the dietician at the local hospital, but the PCP has had to alter Mr. Reed's diabetes medication multiple times as his diabetes markers continue to show inadequate glycemic control.

Mr. Reed's PCP recently became part of an accountable care organization (ACO) and is evaluating and optimizing support for the population of diabetic patients including Mr. Reed. Steps taken include the following:

- Obtaining data from the electronic health record on all of the diabetic patients for the past 2 years including Hemoglobin AlC, number of emergency department visits, number of hospitalizations, and compliance with routine office visits
- Risk-stratifying diabetic patients into high-risk, medium-risk, and low-risk categories based on these data
- Developing a process for follow-up with high-risk and medium-risk patients to assure that they are taking their medications, keeping routine office visits, staying up-to- date with their preventive care, and do not have problems or barriers to controlling their diabetes. A nurse care manager in the PCP's office has been designated with this job . .
- Creating a patient portal where patients can access their laboratory results, send e-mails to the PCP or his or her nurse, make office appointments, and access resources including transportation options listed with contact information
- Providing patient education brochures and materials to be made available in the waiting room and examination rooms as well as health educators to help patients gain an understanding of their medical conditions and gain skills in self-management
- Providing support for diabetic patients to optimize their diet and physical activity. After investigation by the PCP’s office staff, the PC becomes aware of a number of resources available m the community.

These include diabetes self-management classes, nutrition classes where patients are taught how to shop, cook and make choices while eating out, and exercise programs at both the local YMCA and senior center. The PCP is able to get a list of locations, dates/times and contact information for these classes to provide to patients in the office and through the patient portal. Additionally, a local supermarket chain offers reduced prices for fruit and vegetables with a physician's prescription "coupon"

- The local hospital's Community Health Needs Assessment and the county's Health Improvement Plan both indicate diabetes as a high-priority condition and a number of planned targeted initiatives at the community level. The local hospital is now offering a sustain- ability program for seniors.

Mr. Reed presents to the emergency department with a complaint of weakness. Workup in the emergency department is significant for elevated blood pressure and elevated non-fasting blood sugar. In light of Mr. Reed's complaint and medical history, he is admitted to the hospitalist service at the hospital to rule out a cardiac event. During his hospitalization, his blood pressure is controlled and his blood sugar improves with a diabetic diet and rest. A heart attack is ruled out. Mr. Reed is discharged home on a new medication for blood pressure.

In the past, Mr. Reed {and other patients in the practice) would receive discharge instructions and a new prescription, and would be instructed to schedule a follow-up appointment with their PCP. Mr. Reed did not always do this. The hospital discharge summary may have arrived in the PCP's office several days later or may have to be requested when Mr. Reed has his next appointment and **says** he was hospitalized.

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Professor M. Gatto

Final Exercise Please respond to each concepts' question in a complete and detailed manner. For your responses, present in essay format.

1. In consideration of Mr. Reeds health challenges with chronic disease management and ie. Blood sugar control, weight awareness, medication adherence, exercise potentials just to name a few, what defining aspects of social determinants of health play a key role contributing to health disparities resulting a potentially negative outcome. **(Developed a detail and comprehensive response)**.

2. What defining aspects of social determinants of health, supported by cultural competency and health literacy could lead to positive health outcomes. **(Developed a detail and comprehensive response)**

3. Considering Mr. Reeds journey (and many more like him/her) and your role to strategically approach health concerns of the communities you serve, what programmatic processes and alignments would you implement to address the overall PopH status of your community.

4. The Primary Care Physician (PCP) and the hospital are part of the same Accountable Care Organizations (ACO), what new provisions of care, technologies and protocols maintaining health shall institute to support Mr. Reed's ongoing journey to remain healthy, to live a positive quality of life.