

Advancing Population Health at Academic Medical Centers: A Case Study and Framework for an Emerging Field

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Abstract

The Triple Aim framework for advancing health care transformation elevated population health improvement as a central goal, together with improving patient experiences and reducing costs. Though population health improvement is often viewed in the context of clinical care delivery, broader-reaching approaches that bridge health care delivery, public health, and other sectors to foster area-wide health gains are gathering momentum. Academic medical centers (AMCs) across the United States are poised to play key roles in advancing population health and have begun to structure themselves accordingly. Yet, few

frameworks exist to guide these efforts. Here, the authors offer a generalizable approach for AMCs to promote population health across the domains of research, education, and practice. In 2012, NYU School of Medicine, a major AMC dedicated to high-quality care of individual patients, launched an academic Department of Population Health with a strongly applied approach. A rigorous research agenda prioritizes scalable initiatives to improve health and reduce inequities in populations defined by race, ethnicity, geography, and/or other factors. Education targets population-level thinking among future

physicians and research leadership among graduate trainees. Four key mission-bridging approaches offer a framework for population health departments in AMCs: engaging community, turning information into insight, transforming health care, and shaping policy. Challenges include tensions between research, practice, and evaluation; navigating funding sources; and sustaining an integrated, interdisciplinary approach. This framework of discipline-bridging, partnership-engaging inquiry, as it diffuses throughout academic medicine, holds great promise for realigning medicine and public health.

In 2008, Berwick and colleagues¹ introduced the Triple Aim strategy to advance health care reform in the United States through (1) improving the individual experience of care, (2) improving the health of populations, and (3) reducing per capita costs of care for populations. In so doing, they sowed the seeds for making population health improvement a central tenet of health care transformation. Subsequently, this emphasis on populations has been construed both clinically, as connoting the roster of patients under care in a

given system, and more broadly, as a call for health care delivery to contribute to the health of all persons in an area or region.² This more comprehensive approach has given rise to a wide range of initiatives to better align primary care and public health³—including, for example, using health care delivery as an opportunity to identify social determinants that affect patients' health and helping patients meet needs in social (nonclinical) domains,^{4,5} or encouraging hospitals to serve as anchor institutions that foster community development and broad-based health improvement.⁶

time was right for academic medical centers (AMCs) to endorse a population health mission and take a central role in advancing the health of populations.⁷ We believe, as do others,^{8,9} that AMCs should assume strong leadership in the area of population health improvement for a variety of reasons: the growing focus on population-oriented payment mechanisms, the plethora of unanswered research questions regarding effective and financially stable models of care, the need to train health professions in new paradigms, and the fundamental social mission of AMCs (which, with their affiliates, deliver a disproportionate share of charity care and care to patients with Medicaid in the United States¹⁰).

Recently, AMCs across the United States have begun to launch a variety of new efforts that focus on population health.^{11,12} Yet, few published frameworks exist to guide AMCs in developing comprehensive, domain-spanning approaches to the field. Here, we describe a framework developed by faculty at the Department of Population Health at the NYU School of Medicine and NYU Langone Health (together referred to herein as NYU Langone) that can serve as a generalizable approach for other departments seeking to promote

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population health across the domains of research, education, and practice. The framework we describe aims to advance both clinical and area-wide population health through institutional transformation and community and cross-sectoral partnerships. To help inform allied efforts at other AMC's, we offer examples of strategic collaborations, successes, challenges, lessons learned, and emerging opportunities.

Establishing a Department of Population Health at NYU

In 2012, NYU Langone launched the Department of Population Health, one of the first such departments nationally at a major academic medical center. Initial goals for the department included serving as the institution's primary academic home for (1) research in the population health sciences, (2) education and training in population health, (3) advancing system-level innovation across NYU Langone's health care delivery system, and (4) improving population health and health equity among New York City (NYC) residents. Since its inception, the department has more than doubled in size, reflecting targeted recruitment, growth in grant revenues, and strategic realignment of select faculty from other departments. Its 97 full-time faculty and 346 staff are drawn from diverse disciplines, including general internal medicine, epidemiology, biostatistics, decision science, economics, informatics, psychology, engineering, health policy, education, law, and ethics. Although approximately 30% of faculty are physicians, the department is not responsible for a clinical service and is thus considered a "basic science" department by the institution. The budget comprises grant revenue (approximately 70% from federal sources) and institutional operating resources proportional to the department's size and activity.

Six divisions (Health and Behavior; Epidemiology; Biostatistics; Comparative Effectiveness and Decision Science; Healthcare Delivery Science; and Medical Ethics) and several centers constitute the department's principal organizational units. Outcomes tracked by institutional leadership include extramural funding, teaching and curriculum development, delivery system support, and community engagement.

Major Goals and Strategies

While housed in a major AMC dedicated to high-quality care of individual patients, the department's primary focus is at the population level. The term "population health," as defined by Kindig and Stoddart¹³ and others, encompasses "the health outcomes of a group of individuals." While this definition can apply to groups of patients, the Department of Population Health often focuses on populations more broadly defined. Department research initiatives, for example, may concentrate on "women with congestive heart failure seen at outpatient sites in the last 12 months," "all 4-year-old children in NYC public pre-K programs," or "all African American men at risk for hypertension in northern Manhattan." Faculty thus undertake research in a range of hospital, ambulatory care, community, and public-sector settings. Although the department is home to some basic discovery-oriented research, its overall portfolio skews toward applied research with the near- or longer-term goal of measurably improving health at the population level. Rigorous evaluation of initiatives in frontline settings (e.g., busy small-office physician practices, public housing, or community-based social service agencies) is a related focus. The department works to identify scalable interventions to reduce health inequities in populations defined by race, ethnicity,

socioeconomic status, geography, and/or other factors.

The department's educational initiatives are focused at the population level as well. Medical students are introduced to health systems and social determinants of health and are prepared for practice in a world in which fluency with social contexts and evolving payment paradigms is increasingly important. At the graduate student level, we train professionals to become leaders in interdisciplinary research methods to guide health care delivery science, health promotion, health policy, and population health research.

The department's overarching goals are to advance knowledge of key drivers of, and accelerate improvements in, population health and health equity. To this end, the department has adopted four core approaches in an integrated fashion: engage community, turn information into insight, transform health care, and shape policy (see Figure 1).

Engage community

Partnership and collaboration are fundamental to conducting meaningful research in population health, to ensure that goals align with real-world priorities, and to build equity. Further, research is better suited to downstream translation when it is designed to accommodate the uneven terrain of frontline settings. To this end, the department engages a diverse set of stakeholders and community partners in research, seeking to improve outcomes of shared interest and to inform paths to sustainability and scale. Researchers in the department have developed relationships with entities ranging from barbershops, faith-based settings, community-based organizations, health systems, and medical practices, to city and state agencies representing health, housing, criminal justice, and education. The department strives for trust, explicit value to all parties, and aligned objectives.



Figure 1 Key interdependent, bridge-building approaches for academic medical centers seeking to advance population health and health equity.

For example, the department's Center for the Study of Asian American Health recruits community health workers (CHWs) from South Asian communities burdened by high rates of diabetes and hypertension. CHWs work with residents, specifically in the NYC boroughs of Brooklyn and Queens, to prevent and manage diabetes by integrating healthy eating and physical activity into daily routines. The CHWs engage local mosques, gurudwaras, and temples in hands-on nutritional interventions emphasizing ingredients and recipes indigenous to participants' cultures. A rigorous, controlled evaluation has demonstrated sustained reductions in participants' weight, thus also diminishing their risk for diabetes.^{14,15} Study findings have been cited in Community Preventive Services Task Force guidelines recommending deployment of CHWs to support diabetes prevention efforts.¹⁶

Another program, the Men's Health Initiative, housed in the department's Center for Healthful Behavior Change, partners with "trusted places" such as barbershops and churches in the black community and enlists "trusted people" (barbers and pastors) to promote colorectal cancer (CRC) screening among black men, the population most likely to die from CRC in the United States. The program has engaged more than 200 barbershops and other community venues, reaching over 7,000 black men. Of these, researchers have randomized 1,100 into five-year studies of community-based motivational counseling and patient navigation. Findings include that participants who receive navigation are more than twice as likely to complete CRC screening at the end of the six-month study period than those who receive standard referrals from their doctors.¹⁷ This study, combining rigorous design, place-based recruitment, health-related outcomes, and a scalable paradigm, typifies an approach that researchers in the Department of Population Health seek to advance.

In addition, the department at its inception sought and was granted permission from NYU Langone to develop and lead the medical center's Community Service Plan (CSP), which addresses the institution's "community benefit" mandate required by the Affordable Care Act and New York State

law.^{18,19} Moving the CSP beyond the "charity care" approach common to many community benefit programs, the department has shaped it into a platform for implementing evidence-based health promotion and disease prevention initiatives outside the walls of the health care system. The CSP initiative has forged durable, long-term partnerships with community organizations to address risk factors for obesity, to reduce tobacco use, to prevent teen pregnancy, and to support parenting and early childhood development. The CSP—guided by the inclusive Coordinating Council, a group of stakeholders drawn from partner community groups—defines its areas of focus based on a community health needs assessment and on the public health priorities of New York State and NYC.

Turn information into insight

The department is home to experts in producing—and using—novel, rigorous research methods from a variety of disciplines to address core questions regarding causes of illness and effective approaches to prevention, treatment, and dissemination/implementation of findings. In addition to collecting and analyzing new data, researchers also unlock insights embedded in existing data from diverse sources. Areas of particular strength include behavioral economics, comparative effectiveness, pragmatic trials in frontline settings, natural experiment studies, fusion of survey and biomeasure data collection, measurement of health-related behavior change, integration of diverse big data sources, and predictive analytics and machine learning. To design research with traction in frontline settings, department researchers often integrate quantitative and qualitative approaches and apply spatial analytics to address place-based and social determinants of health. Experts evaluate health care delivery interventions using rapid-cycle assessment, and they frequently solicit stakeholder input to expedite actionable, scalable solutions.²⁰

For example, researchers housed in the Department of Population Health first found a connection between the presence of specific communities of oral microbiota and the subsequent development of pancreatic cancer by applying novel computational approaches to test for phylogenetic similarity across bacterial communities.²¹ Now these

investigators have moved on to study whether modifiable behaviors, such as smoking and consuming specific foods, confer risk for developing these oral microbiota profiles. At the other end of the translational spectrum, department faculty members have combined datasets of NYC food establishments with health outcome data to determine the influence of the food environment on a range of health outcomes, including childhood obesity, diabetes, and cancer. Such augmentation of large-scale dataset integration with field-level assessments (e.g., fast food receipt collection, or direct observation of in-school behaviors) allows investigators to leverage natural experiments for rigorous analyses that may affect policy. Finally, using small-area analytics and data visualization tools, department faculty have launched a City Health Dashboard²² to equip urban leaders from 500 cities with data on key indicators of health outcomes and social/environmental determinants to catalyze public health improvement in their municipalities.

Transform health care

The department is working to accelerate the transformation of health care delivery from a volume- to a value-based approach.^{23,24} Faculty are developing new models for how clinical populations access care, and they are working to improve and link community-based, office-based, and hospital-based care through information technology applications. While not charged with responsibility for a specific clinical service or initiative, the department collaborates closely with clinical and delivery system leaders to support their efforts in improving outcomes in the clinical populations for which they are accountable. Examples include improving the identification of high-risk populations, accelerating the adoption of evidence-based guidelines by primary care practices, evaluating the effectiveness of specific value-based care interventions, and leading and implementing rapid-cycle trials of alternative approaches to delivering care.

To advance the goal of bridging the traditional divide between research and operations, the department sought and received the support of institutional leadership to develop the Center for Healthcare Innovation and Delivery Science (CHIDS). The primary goal of

CHIDS is to accelerate NYU Langone's development as a "learning health care system," harnessing advanced analytics and design principles with the twin aims of improving care and generating generalizable knowledge. To cement the connection between research and health care and to ensure that priorities align across these two domains, CHIDS is governed by a steering committee composed of NYU Langone's senior leaders. CHIDS's extramural funding for practice transformation initiatives has grown steadily. For instance, in collaboration with the Department of Radiology and the design firm IDEO (Palo Alto, California), CHIDS faculty are leading 1 of the 12 Patient Safety Learning Laboratories funded by the Agency for Healthcare Research and Quality. The initiative, called the Patient Imaging Quality and Safety Laboratory, involves redesigning NYU Langone's inpatient, emergency department, and outpatient workflows and processes to reduce unnecessary imaging, ensure appropriate follow-up of incidental findings, and improve the care of patients undergoing inpatient interventional radiology procedures. In addition, with institutional support, CHIDS launched a rapid-cycle randomized controlled trial (RCT) unit, enlisting frontline clinicians and staff to iterate existing practice or test new ideas. Such trials produce the strongest evidence of efficacy and allow results to be evaluated swiftly. Most important, these trials inculcate a learning culture within the health system, empowering employees to continually seek to improve the evidence base for the care they provide. Trials have been started in the following: care management (randomizing receipt of high-intensity services for frequent emergency department users; randomizing alternative scripts for outreach calls), information technology (randomizing iterations of clinical decision support alerts), and ambulatory clinics (randomizing text for recruiting patients to complete patient-reported outcomes instruments). CHIDS advances education as well by hosting Academy Health Delivery System Science fellows, involving trainees in projects, and providing health-systems-related education to medical students and public policy students.

Shape policy

The department aims to expand the evidence base for and evaluate policies

that advance population health. For example, its Center for Early Childhood Health and Development is home to ParentCorps, a family-centered, multicomponent intervention for parents, teachers, and children that works to reduce health disparities and close the achievement gap. ParentCorps, developed to be accessible and effective for low-income families of color, is embedded in high-poverty schools to create a sustainable mechanism to reach the majority of preschool-aged children and their families, and is timed for when children acquire the self-regulation skills foundational for healthy development. RCTs of ParentCorps in NYC public schools have demonstrated long-term benefits for children, including greater reading achievement, improved mental health and health behaviors, and lower rates of obesity. A cost-effectiveness analysis has demonstrated more than \$4,000 in savings over the course of a lifetime. Building on this evidence, NYC recently integrated ParentCorps into its citywide universal "Pre-K for All" initiative, along with plans to rigorously evaluate the implementation and impact of the program at scale.²⁵⁻²⁸

Policy-focused work conducted in the department's Section on Health Choice, Policy, and Evaluation has examined the impact of providing incentives to choose healthful foods through the Supplemental Nutrition Assistance Program and of using the grocery delivery program Fresh Direct (New York, New York) in low-income neighborhoods. In 2015, researchers from this team found that NYC's calorie labeling program did not, on its own, lead consumers to change their fast-food ordering to choices with fewer calories,²⁹ and in 2016, the team demonstrated that a program to make fresh water more available in NYC public schools through self-serve water dispensers in cafeterias resulted in small but statistically significant declines in students' weight.³⁰

The department's Division of Medical Ethics maintains a strong health policy focus and holds the just distribution of scarce resources as a core goal. For example, the division established the innovative, multistakeholder Compassionate Use Advisory Committee in collaboration with pharmaceutical industry collaborators to review and make recommendations regarding

requests for a novel immunotherapy for multiple myeloma, which is in very limited supply.³¹ Such applied work—strongly grounded in ethics theory, yet fully engaged with real-world complexities—has broad implications for addressing scarcity in multiple domains, from experimental vaccines to organs for transplantation.

Interdependence of Approaches

The four approaches, which together offer a framework that population health initiatives developing at other institutions may consider for adoption, interface and intersect as depicted in the braided figure (see Figure 1). For example, community-engaged initiatives involving lay health workers and patient navigators inform the efforts of department faculty working on policy initiatives addressing workforce and reimbursement. Research on the electronic health record turns information into insight and contributes to the transformation of health care by advancing a learning health care paradigm. An emphasis on the value of engaging diverse disciplines in each of the four approaches is integral to productivity at the interfaces between them—as is the recognition that strategies and solutions may need to vary across diverse subpopulations and across the life span. The department fosters activity in discipline-bridging areas such as behavioral economics, social epidemiology, and health policy by deliberately engaging faculty from diverse fields in strategic planning initiatives, internal grant reviews, and curriculum design.

Training the Next Generation in Population Health

To advance the science and practice of population health, the Department of Population Health has made training a priority. Educational goals and curricular content reflect learners' objectives and needs.

Medical students

The department seeks to equip medical students with the population health competencies necessary to practice effectively in a rapidly evolving health care environment and to embrace accountability for populations as well as individual patients. Department faculty have worked with the medical

school's leaders to bake the core domains of population health—including the underlying drivers of health, strategies for addressing health inequities, health care delivery science, and health policy—into the curriculum. In the fall of 2016, NYU School of Medicine inaugurated population health as one of six “pillars” or longitudinal themes woven throughout students' education—the first pillar not to be specifically disease oriented. Curricular content includes the supervised exploration of datasets addressing local hospital quality and costs, as well as sessions addressing neighborhoods, disparities, and health policy. Electives, concentrations, summer project opportunities, and dual-degree programs enrich and complement classroom formats. Most recently, planning was initiated for a major new medical school curriculum that will embrace primary care, population health, and health care delivery science as its overarching framework.

Graduate students

The department prepares graduate students for careers as leaders in the evolving interdisciplinary field of population health research. Doctoral and postdoctoral training are currently offered in epidemiology and biostatistics. Students enrolled in these programs learn and study alongside biology, immunology, developmental genetics, and computational biomedicine graduate students at the medical school's Sackler Institute of Biomedical Science, which spans a “cells to society” continuum. Because improving the health of populations requires a multifaceted approach, course work is interspersed with apprenticed rotations that cross disciplinary boundaries. A new PhD track in population health is set to launch in fall 2020. Additional master's-level degrees are available in comparative effectiveness research, health disparities, clinical investigation, and bioethics.

Tensions

Challenges emerge when a department at an AMC adopts an agenda of improving population health and health equity.

The first is an inherent tension between research and practice. Conducting extramurally funded research and generating peer-reviewed publications,

though deeply rewarding, leaves some research faculty seeking more direct engagement in improving the health status of the populations with whom they work. The focus on scholarly output is mitigated, however, by the applied nature of much of the department's research, including through ongoing partnerships with local communities and public health agencies. Additionally, the department's track record of initiatives that have grown to scale has helped foster an understanding among faculty of the pace at which change manifests in improved health and reduced inequities at the community level. Another issue at the junction of research and practice is titrating departmental engagement with the institution's health care delivery system, as the line between informing and directing operations requires steady curation. NYU Langone's structure, in which a single individual is both dean of the medical school and chief executive office of the delivery system, helps support mission-bridging initiatives.

A second tension is that between research and evaluation. Some AMCs may value rigorous and timely evaluation of policy and programmatic initiatives less than they do formal research programs. Yet, success for population health departments requires embracing both basic discovery and applied research. The latter often fosters and adds rigor to frontline partnerships while also generating valuable preliminary, and at times actionable, findings.

A third tension relates to sources of research funding. For most AMCs, National Institutes of Health (NIH) support is the most sought-after source of financial support because of its prestige and associated impact on national rankings. Yet other federal agencies, as well as foundations and philanthropies, are equally essential for population-health-oriented research. While the NIH remains the source of approximately half of the Department of Population Health's research support, maintaining a balanced portfolio of funders requires constant attention, particularly during periods of flux in federal policy and NIH pay lines.

A fourth tension is to balance the natural academic tendency of sorting into centers, divisions, and programs with the need to facilitate the essentially

interdisciplinary work needed to advance population health research and impact. To minimize this “siloeing,” department leaders have found great value in conducting ongoing high-level conversations about overall strategic direction. The institution has also developed structural approaches to appropriately share credit between departments for jointly authored extramural grants, which helps foster collaboration and mitigate competition.

Discussion

Propelled by evolving payment paradigms and by a growing understanding of the impact of social determinants of health, AMCs and other health systems across the United States are increasingly endorsing population health as an area of focus.^{32–35} A steady stream of new departments are forming as AMCs respond structurally to the emergence of population health as a field.^{36,37} Change at this scale represents a milestone on the path toward deeper alignment between medicine and public health. The four mission-bridging approaches we have set forth herein offer a framework for adoption by leaders of other new or evolving population health departments to guide their efforts and, in turn, enhance their aggregate impact on improving health and health equity in clinical and geographic populations.

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