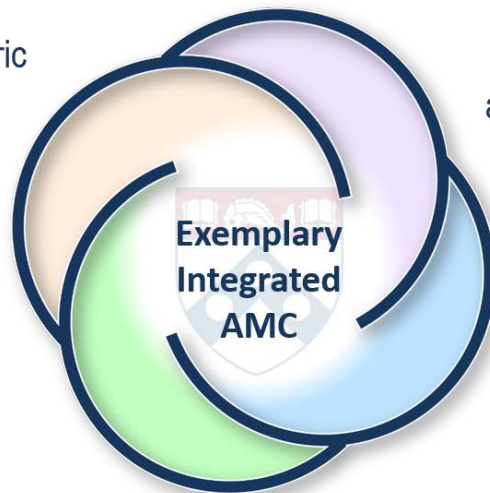


Shaping the Future of Medicine 2.0

***The Next Era of Innovation and Impact
2018-2023***

Provide Patient-Centric
Care of the Future

Promote Lifelong
Learning



Pioneer New Discoveries
and Therapies for Patients

Foster Inclusion,
Engagement, and
Professional Development

Our Mission: *Our mission is to advance knowledge and improve health through research, patient care, and the education of trainees in an inclusive culture that embraces diversity, fosters innovation, stimulates critical thinking, supports lifelong learning, and sustains our legacy of excellence.*

Our Vision: *To empower the talent within our integrated Academic Medical Center to find new cures, disseminate knowledge, and improve health for all people.*

I. EXEMPLARY INTEGRATED ACADEMIC MEDICAL CENTER

Over the past five years, Penn Medicine has continued to gain momentum as a preeminent integrated Academic Medical Center (AMC),¹ building on its historic standards of excellence. Successful implementation of the *Shaping the Future of Medicine* strategic plan (2012-2017; Appendix A) has driven fundamental discoveries that are translated into faster and more accurate diagnoses and provide the most innovative therapies across the continuum of care. Whether in circadian biology, epigenetics, immunotherapy, precision therapeutics, or many other areas, Penn Medicine leads the way in extending breakthrough science into exemplary patient care. Penn Medicine is a place where our diverse faculty, students, and staff work collaboratively to inspire us with creative ideas that we disseminate across the world to transform education, discovery, and patient care.


We recognize that a key element of our success – and a feature that differentiates us from other AMC’s – is the full integration of our core mission areas of education, research, patient care, and community service under the governance umbrella of Penn Medicine. More broadly, Penn Medicine is integrated into the governance of the University of Pennsylvania and aligned with the mission of the University (Inclusion/Innovation/Impact). This allows us to leverage the knowledge and skills of faculty in 11 other remarkable schools.


Shaping the Future of Medicine 2.0 (2018-2023) will strengthen and accelerate Penn Medicine’s impact by enhancing the essential attributes of our integrated AMC:


- Championing a culture of innovation, excellence, inclusion, and collaboration;
- Attracting and supporting the most talented faculty and effective leaders of departments, centers & institutes, and the health system;
- Leading in the use of informatics to catalyze discovery and integrate research and clinical care;
- Ensuring strong financial performance with balanced support across missions; and
- Being a world leader in all mission areas.


The Penn Medicine strategic plan is organized around four themes that constitute the pillars of our aspirations. In each of these domains, *Shaping the Future of Medicine 2.0* identifies major opportunities and strategies to propel Penn Medicine forward. Among these, the Executive Planning Council recommends that the following priorities be placed at center of this five-year plan.

¹ Use of the term “academic medical center” throughout this document is intended to incorporate the broad geographic presence of our health system.

-  **Provide Patient-Centric Care of the Future, by:** Driving innovation in the delivery of high quality and high value care for all patients; providing a world-class inpatient care experience on Penn's campus; expand access to comprehensive and coordinated care across the region while preserving the extraordinary quality of clinical programs; creating an overarching physician organization for all Penn Medicine patients to promote population health management; and harnessing the power of data science to provide precision diagnostics and therapies that will result in better health and fewer hospitalizations.

-  **Pioneer New Discoveries and Therapies for Patients, by:** developing new methods and technologies to transform biomedical research; advance first in human trials based on these discoveries; catalyzing entrepreneurship and new commercial partnerships to advance health and cure disease; fostering a culture of interdisciplinary collaboration throughout Penn's campus; and applying public health scholarship and health care delivery science to achieve both regional and global impact on health.

-  **Foster Inclusion, Engagement, and Professional Development, by:** championing inclusion and diversity across Penn Medicine; launching innovative personal and professional development programs to foster engagement and advancement; and driving individual and organizational change initiatives to promote wellness and resilience in a rapidly evolving biomedical research and healthcare environment.

-  **Promote Lifelong Learning, by:** transforming and integrating the curriculum across the continuum of undergraduate medical education, graduate medical education, and continuing medical education; developing innovative methods for on-line education and experiential learning; fostering engagement of all trainees (e.g., PhD, MD, MS) in cross-training activities across our dynamic campus; and enhancing trainee wellness, as well as personal and professional development.

This strategic plan will ensure that we accelerate the significant momentum achieved with our previous plan. We will enhance our ability to offer patients the most advanced diagnostics and therapies across our expanded health system. In parallel, we will promote the health of individuals and populations through dissemination of accessible primary care and employ innovative programs both locally and globally to increase engagement and impact. New investments in top talent and the latest technologies and informatics platforms will enable pioneering discoveries among our scientists advantaged by increased support from diverse funding mechanisms. These innovations will become the next cures, enhancing Penn Medicine's culture of excellence. As a result, we will attract the best and brightest students to Penn, while enhancements in our supportive and entrepreneurial culture will increase the vitality and well-being of our faculty, staff, and trainees, making Penn Medicine among the best places to work in the world. Finally, we will reflect upon our successes, communicating about our strengths and unique assets to both internal and external stakeholders.

II. PLANNING PROCESS

Organizing Framework

In fall 2016, Dean J. Larry Jameson, MD, PhD, initiated a planning process to accelerate the institutional momentum achieved under its previous strategic plan. Caryn Lerman, PhD, Vice Dean for Strategic

Initiatives, was designated to oversee the planning process, and an Executive Planning Council (EPC) representing our integrated academic and health system leadership was constituted.



The planning process for *Shaping the Future of Medicine 2.0* began with a formal review of accomplishments under the previous plan and a survey of school and health system leadership to identify the most innovative and eminent programs across Penn Medicine (Appendix A). Reflecting on the lessons and achievements of the last five years, Dean Jameson’s vision for change focused on areas of opportunity where Penn Medicine could distinguish itself as one of the top three AMCs in the world. Complementing a set of bold ongoing strategic initiatives, six areas were identified as benefiting from additional planning and a sharper focus: (1) harnessing the power of data science to advance biomedical research and care delivery; (2) promoting health care quality and value for all patients; (3) developing and providing new tools and methods for discovery; (4) reducing health disparities through public health science across Penn’s campus; (5) fostering diversity, engagement and advancement; and (6) reimagining education. Work groups were comprised of faculty members across Penn Medicine and those representing seven schools and CHOP, as well as administrative staff and trainees (Appendix B). Charged with proposing transformative initiatives in all of Penn Medicine’s mission areas for the next five years, these groups met for a period of eight weeks and provided comprehensive reports and recommendations to the EPC.

Input and Communication

Throughout this process, we solicited and received input from broad constituencies. Over 100 faculty and staff members across Penn Medicine provided direct input through participation on committees and subcommittees. Additional input was solicited from >50 administrative staff members and >150 faculty members who participated in discussion sessions in the venues described below. Community-wide emails and video communications disseminated information about the planning process and solicited broad community input.

Emerging recommendations were communicated at venues across the Penn Medicine enterprise – including the Penn Medicine Board of Trustees, the Standing Committee of Department Chairs and Center Directors, the Medical Faculty Senate, Basic Science and Clinical Departments, the Business Administrators Forum, and through community-wide emails. The EPC met throughout this process to refine and prioritize recommendations. The goals and objectives below reflect this highly inclusive process.

III. PENN MEDICINE'S STRATEGIC PRIORITIES

A. Provide Patient-Centric Care of the Future

We will:

Prevent disease before it occurs

When disease does occur, diagnose it early and cure it

Provide access to innovative diagnostic advances and clinical trials

Empower patients to optimize their health and quality of life

Provide compassionate care with a personal touch.

Our patients and their families deserve exceptional care and service. The opening of the Perelman Center for Advanced Medicine (PCAM) in 2008 provided an inflection point in our approach to patient-centered care. Symbolically, and practically, the new facility organized teams of health care providers around the needs of patients in a vibrant environment that is warm and welcoming. Penn Medicine's *patients-first* approach to care is instilled throughout our hospital system that now includes five acute-care hospitals and hundreds of outpatient centers throughout our region. Wherever possible, the features of PCAM have been replicated in new and renovated facilities. Our providers and staff have focused on service excellence that complements our clinical expertise in multiple specialties. Within these advanced facilities, Penn Medicine leads the way in leveraging technology and fostering innovation to transform healthcare delivery and improve patient outcomes. Exemplifying this innovation, the Penn Medicine Center for Healthcare Innovation drives organizational improvement through a disciplined process of experimentation, evaluation, and implementation of new models of care delivery. In parallel, the newly established Center for Digital Health evaluates the links between social media and health, developing novel ways for clinicians to deliver care through these channels. These efforts are fostered by PennChart, which enables patients and their care teams to access their health data anywhere at any time – with confidence that the information will remain private and secure.

Reflecting Penn Medicine's excellence in healthcare delivery, HUP and Penn Presbyterian Medical Center are ranked consistently among the top 10 hospitals in the country, according to *U.S. News & World Report*. All five Penn Medicine acute-care hospitals are ranked among the top 15 in Pennsylvania with HUP's ranking as #1 in the region. All five hospitals have also achieved Magnet status from the American Nurses Credentialing Center, which recognizes nursing excellence. In addition, Penn Medicine consistently has the most physicians in the region featured on *Philadelphia* magazine's "Top Docs" list, and in 2017 was named #7 on *Forbes* magazine's annual list of "Best Employers in America."

Building upon our tremendous momentum in healthcare delivery and our *patients-first* culture, we imagine a future of a highly connected healthcare system in which our world renowned providers and researchers work together to promote population health, resulting in fewer hospitalizations and healthier, longer lives for our patients. Wireless monitoring devices will connect us to our patients, delivering real-time data on health status to provide the right diagnoses and treatments at the right time in the right setting. These same devices will gently nudge patients to engage in healthy habits, engaging and empowering them as partners in health promotion and disease prevention. To achieve our aspirational goals, we will: deliver advanced healthcare of the future in a new hospital facility on Penn's campus; expand access to high quality, high impact clinical programs throughout our region; leverage informational technology and "big data", including genomic and phenotypic information, to

accelerate biomedical research and improve patient care; and apply the latest advances in behavioral economics and health care delivery science to transform how teams of providers work together to deliver high value, high quality care.

Build the Patient Care Hospital of the Future

With the opening of the Perelman Center for Advanced Medicine, Penn Medicine has led the way in the provision of unrivalled outpatient care on Penn's campus. Beyond the main campus, we now care for patients in hospitals and outpatient facilities from Central Pennsylvania to the Jersey Shore. To meet the need for advanced inpatient care and superlative service for these patients and their families, the New Pavilion at the Hospital of the University of Pennsylvania will be a centerpiece for Penn Medicine's clinical mission. With demolition of Penn Tower completed and construction of the Pavilion foundation under way, a groundbreaking ceremony was held in May 2017. Scheduled to open in 2021, the Pavilion will soon take its place among the most ambitious projects in the City of Philadelphia's history.

Guiding principles of the project emphasize patient experience, flexibility, and innovation for exceptional care, along with community participation and investment. Comprising the Pavilion's multidisciplinary design team, innovators across the University are testing new ideas that will improve efficiency and help patients and families better communicate with their care team. The 1.5 million square foot facility will house 504 private patient rooms and 47 operating/interventional rooms, providing inpatient care for the Abramson Cancer Center, heart and vascular surgery, neurology and neurosurgery, and a new emergency department. The new Pavilion will be sustainable, efficient, uplifting and sensitive to its surroundings and occupants. To achieve these impactful goals, we will pursue the following objectives and strategies:

- **Create an exceptional inpatient experience that enhances mental and physical well being**, by: designing all patient rooms as private to improve patient-provider communication and enhance sleep quality; using design, materials, and ventilation systems to minimize risk of communicable disease; using flexible room-planning models that enable patients to access healthcare information technology; customizing patient rooms for greater family involvement in patient care; and applying an on-stage/off-stage design concept to reduce noise levels in patient corridors and improve efficiency and patient and provider satisfaction.
- **Train tomorrow's physician leaders to deliver advanced care**, by: engaging students, residents and fellows in the design and creation of novel solutions to everyday hospital challenges; leveraging cutting-edge technology to enable data and image visualization for bedside training; and creating uplifting spaces for trainees to interact with each other and with healthcare teams, and to promote trainee wellness.
- **Drive discovery and innovation in healthcare delivery**, by: creating spaces for collecting biological specimens and other data to support biomedical research and innovative clinical trials; and engaging the Center for Healthcare Innovation and the Healthcare Value Engine to experiment with new operational solutions to promote care efficiency and patient outcomes.
- **Promote a sustainable environment**, by: incorporating a community-sensitive outdoor design including a bike park, gardens, and pedestrian bridges; and deploying design and operational strategies to reduce the carbon footprint by 50%.

Enhance Access to Exceptional Patient Care throughout the Region

To increase access to Penn Medicine's exceptional outpatient patient care, we have greatly expanded our ambulatory care centers within a 100-mile radius of Philadelphia from Central Pennsylvania to the Jersey Shore. This expansion also addresses the rapid evolution of the health care landscape, including new partnerships among health care systems and payors, and numerous mergers and affiliations among hospitals and physician groups as a means to enhance access and coordination of care.

Despite this imperative, expansion without attention to preserving the extraordinarily high quality of our clinical services would undermine everything for which Penn Medicine stands. To this end, Penn Medicine spent considerable effort defining the markets most critical to our success and selecting the right partners and expansion opportunities. Quality of the leadership team and medical staff, values of the organization, vision of the Board of Directors, needs of the community, and willingness to engage in strategic clinical alignment were all taken into consideration when making the decision to add Chester County Hospital and Lancaster General Health to the west, and soon, Princeton Health to the northeast. Furthermore, we have reinforced our efforts in Southern New Jersey through a strategic partnership with Virtua Health System, enabling growth in key areas such as Cancer and Neurosciences.

In addition to new hospital system partners, we have invested in several large outpatient sites in critical regions outside of Philadelphia, including Penn Medicine at Cherry Hill, Penn Medicine at Radnor, Penn Medicine at Southern Chester County and Penn Medicine at Parkesburg. While patients continue to choose their health care providers on the basis of quality, they increasingly value convenience and lower out of pocket costs. To build durable relationships with our patients, Penn Medicine must deliver comprehensive and exceptional, coordinated clinical programs in lower cost settings, closer to where our patients live. To realize the full potential of this expanded Health System, we will pursue the following objectives and strategies:

- **Drive excellence in patient care at our ambulatory care facilities**, by: replacing the Penn Medicine facility at Radnor to accommodate expansion of signature service line programs, endoscopy suites, and ambulatory surgery OR suites; expanding Cherry Hill to accommodate expansion of Cancer Center programs, including additional infusion treatment bays and exam rooms; building phase II of Southern Chester County to include additional exam rooms and an ambulatory surgery center; increasing utilization of Parkesburg through an aligned physician strategy between Lancaster and Chester County Hospital; and developing a strategy for increased ambulatory/multi-specialty presence in Bucks County (609/311 corridor) and Princeton.
- **Provide the most advanced care and clinical trials, as well as novel trainee experiences in these communities**, by: evaluating the viability of delivering proton therapy and other advanced treatments in these local markets; leveraging the Office of Clinical Research to expand clinical trials with the necessary quality and regulatory oversight; and creating new research and education opportunities in unique patient settings (e.g., Lancaster county).
- **Foster collaborative engagement with faculty, staff and trainees**, by: working closely with the Clinical Department Chairs throughout the decision-making and implementation process; engaging faculty and trainees to design innovative models for delivering high value care; and advancing our best talent to new leadership roles throughout our expanded healthcare system.

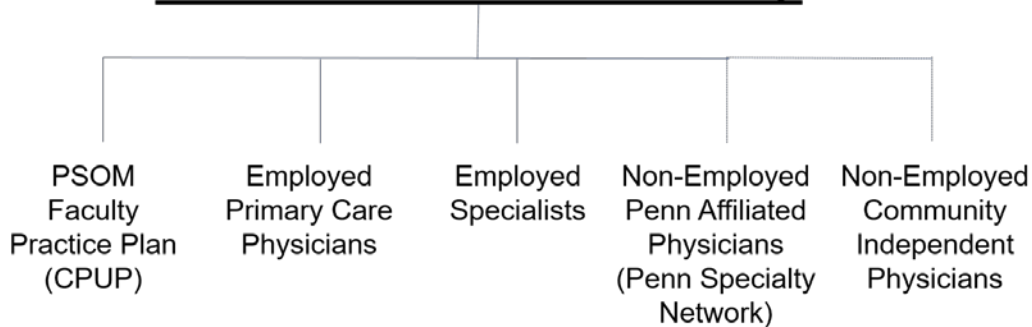
- **Raise Awareness of Penn Medicine’s reputation for excellence**, by: completing a brand refresh engagement; evolving our advanced care messaging to include suburban expansion; and leveraging social media networks.
- **Strengthen integration across our respective hospitals and patient care settings**, by: integrating and unifying relevant aspects of our patient care delivery strategies and systems of care across the health system, where applicable; and ensure that our providers, staff and leadership at the local level are empowered to succeed at delivering care closer to where our patients live.

Create an Overarching Physician Organization to Ensure Coordinated Patient-Centric Care

With their strong commitment to excellence in clinical care, scholarship, and education, Penn Medicine clinicians are among the very best in the world. Yet, as our health system expands, there is a corresponding increase in the scale and complexity of our physician constituents. Beginning with the creation of the Clinical Practices of the University of Pennsylvania (CPUP), and subsequently, the Clinical Care Associates (CCA), Penn Medicine has led the way in creating innovative models to provide access to highly coordinated, high quality, high value patient care.

Penn Medicine now includes Lancaster General Health Physicians (LGHP), employed physicians at Chester County Hospital, and groups associated with our forthcoming merger with Princeton Health Care System. These employed physicians account for approximately 55% (2,500) of the providers across Penn Medicine, while the remaining 45% (2,100) are in independent practice. This substantiates the need for a system wide approach to physician alignment. With this growth in primary care and specialty practices, there is a timely opportunity to organize all of the 4,600 physicians in Penn Medicine to coordinate exceptional care across hospitals, ambulatory practices, and acute care settings. In doing so, we will utilize “micro-market” strategies to address the geographic-specific needs in the market (e.g. Lancaster vs. South Jersey). Our goal is to ensure that all patients have access to the right level of care within our system and to make this experience as seamless as possible, both for patients and providers. To meet this challenge, we will pursue the following objectives and strategies:

Penn Medicine Medical Group



- **Increase access to high quality coordinated care across the region**, by: creating the Penn Medicine Medical Group, and overarching physician organization; ensuring that patient care is accessible, transparent, and consistent across primary care and specialty practices in the region; focusing CPUP on practices where there is substantive education and research activity; reducing variation in care between different employment vehicles and independent practices; and

recognizing the valuable role that independent, non-employed physician groups play across Penn Medicine.

- **Achieve maximal impact on patient outcomes through the use of technology and human resources**, by: gradually centralizing functions across providers and practices to gain economies of scale (e.g., revenue cycle, data analytic, scheduling, provider recruitment and retention, and on-boarding); and maximizing the potential of our “single EHR” across inpatient and outpatient settings to improve care coordination and decrease the administrative burden for providers.
- **Engage our clinical leaders to design new models of high quality, high value care**, by: engaging the key stakeholders throughout the development and implementation process; defining the roles of the Clinical Chairs in the oversight of health care quality and value; and fostering collaboration with the entity CEOs in co-managing local quality and protocol compliance.

Enhance Population Health by Creating a New Primary Care Service Line

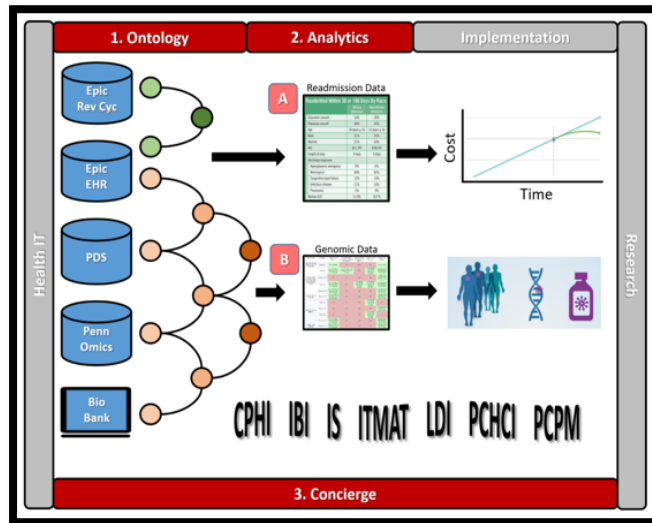
A strong primary care program is key to deliver patient-centered care, reduce health disparities, and keep our patients healthy and hospital free. Penn Medicine provides primary care to patients across a vast geography, from the Jersey Shore to Central Pennsylvania. With over 450 FTEs in Clinical Care Associates, Family Medicine, and the Division of Internal Medicine, Penn Medicine is now one of the largest primary care providers in our region. Penn Medicine’s primary care physicians and staff partner with patients and families throughout their lives to develop personalized goals and wellness plans to meet their unique health needs.

Over the past year, stakeholders from across Penn Medicine served on a Primary Care Steering Committee, working to develop a unified vision and strategy for Penn Medicine Primary Care. This work, led by Peter Quinn and Tom Beeman, included advice from over 40 leaders in various workgroups and has culminated in a set of collaboratively developed recommendations on a unified approach to Mission, Vision and Values, Care Models, Research, Education, and Workforce Development in primary care. Building upon our momentum in creating world class Service Lines that deliver high quality interdisciplinary care in a seamless manner, we will pursue the following objectives and strategies:

- **Create a patient-centered care model that promotes patient satisfaction, quality and value** by: delivering consistent and timely care throughout the Service Line; implementing interdisciplinary team-based models of care; collaborating and coordinating with providers across Penn Medicine; and fostering an inspiring work environment that supports the recruitment, retention, and overall wellbeing of highly qualified primary care providers.
- **Achieve maximal impact on population health through care delivery innovation**, by: recruiting an Associate Medical Director with experience in population health management and health care policy; working with the Center for Health Care Innovation to design rapid cycle experiments to innovate care delivery models and reduce variability in care; and scaling those innovations with evidence for an impact on outcomes.
- **Build an intellectual community in primary care research and education**, by: engaging our best and brightest faculty in system-level primary care research with a focus on health promotion and disease prevention; and creating a system-wide educational model to train the next generation of primary care providers in Penn Medicine.

Harness the Power of Data Science to Advance Biomedical Research and Care Delivery

Penn Medicine has significantly enhanced its informatics ecosystem over the past five years. Established in 2014, the Institute for Biomedical Informatics (IBI) aggregates faculty talent across the University, catalyzing discovery through its cutting-edge computational resources and innovative educational programs. This work has evolved in tandem with the system-wide implementation of Penn Chart and the creation of robust data and biospecimen resources, such as the Penn Data Store, PennOmics, and the Penn Medicine Biobank. Targeted faculty hires led by IBI and the Department of Biostatistics, Epidemiology and Informatics have provided the expertise needed to apply cutting-edge analytic models to reveal the complex patterns in big data needed to advance research and health care.



Penn Medicine is now uniquely positioned to build upon this momentum by leveraging these rich clinical and research data resources, state-of-the-art health information technologies, world-class basic science and clinical faculty, and a thriving health care system. Our aspirational goal is to provide a full-service big data infrastructure to accelerate discovery science on disease etiology and translate this knowledge to improve patient care. To realize this ambitious goal, we will pursue the following objectives and strategies:

- **Maximize the impact of Penn Medicine’s innovative data platform**, by: integrating data from the Penn Data Store, the Penn Medicine Biobank, PennOmics, and Penn Chart for ease of analysis by researchers, clinicians, and executives; incorporating patient-derived data from social media and mobile devices to collect patient data in real time; optimizing EPIC for patient data collection and data access; and recruiting transformative faculty with expertise in the use of the sophisticated computational methods needed to identify and interpret the complex patterns in big data.
- **Innovate clinical care delivery with big data analytics and AI**, by: identifying patterns of care that optimize patient outcomes and value; designing and testing initiatives based on these data to reduce variation in care, drive quality improvement, and improve population health; scaling best practices throughout the health system.
- **Identify actionable genomic and biologic variants to accelerate development of precision diagnostics and therapies**, by: evaluating the clinical utility of biologic variation for precision diagnostics and therapies in rigorous investigations; and integrating a new Penn AI resource with PennSignals for real-time pattern detection in EHR data for clinical decision support.
- **Utilize machine learning and AI technology to drive cutting-edge biomedical research**, by: catalyzing groups of scientists and clinicians to design 2-3 unique, high impact research projects that leverage genomic, immunologic, radiologic, and other big data to predict clinical diagnoses and outcomes; facilitating access to data by faculty, staff, and trainees via web-based and

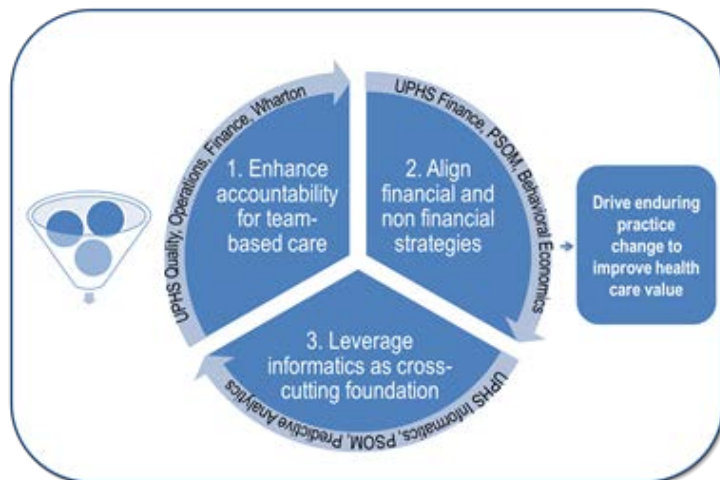
smartphone-enabled applications; and by instituting a comprehensive concierge service that provides the necessary education, training, and support.

- **Train tomorrow’s scholars in biomedical informatics**, by: providing informal education and training for our faculty in the use of these and other emerging informatics technologies; recruiting and supporting new faculty to mentor trainees; and developing certificate and formal degree programs within the Department of Biostatistics, Epidemiology and Informatics.

Promote health care quality and value for all patients

Penn Medicine’s commitment to health care value unites our patients and providers through a common interest in delivering the best possible care. As described above, we have created the performing teams and provider networks to drive high quality health care and enhance patient and provider experiences. In the past five years, we have invested in exceptional new hires and innovative clinical research initiatives that apply behavioral economics, operations research, and other management disciplines to drive value-based choices in care delivery and respond to shifting payment models. These initiatives are already providing insights into how to improve the effectiveness of financial and non-financial strategies to deliver higher quality and efficient health care, driving success in our efforts to expand regionally and deliver seamless, integrated care. Health systems prioritizing value have become fertile ground for health care delivery science, innovation and novel educational initiatives focused on population health, overall societal health, and the patient experience.

Emerging changes in the national health care landscape now elevate the importance of these efforts for our patients, faculty, and trainees. The move away from fee-for-service payment toward value-based payment, reductions in overall reimbursement rates, cuts in federal research funding, and declining educational subsidies are likely to force further cost reductions in both the clinical and educational enterprise. These pressures challenge Penn Medicine’s tripartite mission, market position, relevance to payers, and reputation. Building upon our momentum in this space, Penn Medicine is uniquely positioned to be a world leader in scholarship, education, and practice related to the health care value movement.



Despite the national focus on health care value, there is surprisingly little attention on rigorous assessments of value and objective testing of strategies to achieve value. To meet the challenge to create health care value across Penn Medicine, we will create the Penn Value Engine. Building upon our successes in behavioral economics and health IT, the Penn Value Engine will focus on enhancing accountability for team-based care, aligning financial and non-financial incentives, and leveraging informatics as a cross-cutting paradigm.

To achieve our goal to promote health care quality and value for all, we will pursue these objectives and strategies:

- **Deliver high value care and improved patient outcomes**, by: creating a working laboratory within the Penn Center for Healthcare Innovation to design, test, and scale interventions to promote high value patient care; strengthening our commitment to evaluating how teams perform across health care settings and identifying where care delivery is augmenting or impairing high-value health care; and developing senior leadership accountability within current roles or through new appointments.
- **Keep our patients hospital free**, by: leveraging health data to identify patients at risk for readmissions; executing rigorous short-term experiments to test interventions aimed at reducing unplanned acute care, including hospitalizations and emergency department visits; identifying and incentivizing best practices for reducing unplanned admissions; and creating a cross-disciplinary advisory team of faculty and executive experts to oversee and evaluate progress in this area.
- **Position Penn Medicine as the world leader in health care value scholarship**, by: coalescing groups of thought leaders to create a vision for health care value research, ensuring that Penn Medicine remains at the forefront of scholarship in this area; creating a research and evaluation core to provide the infrastructure for healthcare value experiments; and disseminating generalizable knowledge through high-impact publications and visibility at national meetings.
- **Train the next generation of health care leaders**, by: educating our trainees on the core tenets of the Penn Value Engine and health care value; and creating certificate programs and/or new Masters or PhD Degree programs linked to wider University educational resources such as the Healthcare Transformation course offered by Wharton.

B. Pioneer New Discoveries and Therapies

We will:

Identify questions that have not been asked by fostering an environment of creativity

Invest in fundamental science that can have the greatest impact across fields

Attract and retain innovators and scholars to solve problems through rigorous inquiry

Leverage the latest instruments and research methods to reveal answers to unsolved problems

Be recognized as the most successful institution for fostering translational research

Be identified as a model for conducting rigorous and ethical early phase clinical trials

Always consider how our research findings might be used to enhance the lives of all people

Penn has a long history of conducting groundbreaking fundamental research as well as a track record of success in translating these discoveries to positively impact human health. In recent years, the pace of discovery has increased and Penn has assumed an even more prominent role as a world leader in high impact discovery science. While the size of the research-intensive faculty has stayed relatively constant over the past decade, the number of high impact publications, patents, and research grants has skyrocketed.

Indeed, from 2011-2017, annual sponsored research awards grew from \$583M annually to \$742M. Over that period, the number of high-impact papers published in top-tier journals increased from 220 to 411. Over the past five years, 16 faculty members have been elected to the National Academy of Medicine and six members to the National Academy of Science. Foreshadowing future success, Penn ranked 8th in

the Nature Index 2016 of Rising Stars, which identifies ascendant scientists showing the most significant growth in high-quality research publications.

Penn also sets the standard among academic medical centers in translating fundamental insights into new cures, with notable examples such as groundbreaking advances in curing cancer and in gene therapy to cure blindness. This work is catalyzed by the Institute for Translational Medicine and Therapeutics (ITMAT) and our NIH-funded Clinical Translational Science Award (CTSA), which is commonly considered the strongest in the nation. These achievements are due primarily to the excellence of our faculty, staff and students – our intellectual capital, which we will continue to value as our primary resource for innovation.

Success has also been facilitated by the renewal of our research space and infrastructure, including new research buildings and clinical research space and the renovation of aging research buildings including Stemmler and Richards. Many of our most impactful advances in translational medicine have relied upon fundamental insights into basic mechanisms of molecular, cellular and organismal function discovered in our research labs. These discoveries have had widespread impact and have leveraged our collaborations with the private sector and our engagement with the community and our studies in population science. As we assess and prioritize new opportunities emerging in biomedical research and modern approaches for meeting tomorrow's challenges, we will continue to value the broad and balanced portfolio of our research enterprise that is at the core of our strength and success.

To achieve our aspirational goals to accelerate new discoveries and therapies, we will: enhance fundamental science to solve complex problems in health and disease; develop and provide innovative tools and methods to promote discovery; lead in first-in-human trials of new diagnostics and therapies; catalyze industry and commercial partnerships to drive translational and clinical research; foster a culture of academic collaboration across Penn's campus; and reduce health disparities in our local community through public health science.

[Enhance fundamental science to drive discovery](#)

The understanding of basic mechanisms of biology underpins many of the advances in clinical care that have been pioneered at Penn Medicine, and we will continue to invest in the intellectual capital and infrastructure necessary to remain at the cutting edge in basic science. Recruitment into the tenure track, especially at the assistant professor level, will remain a high priority across the basic science and clinical departments so as to maintain a continuously revitalized faculty pursuing the discovery of new knowledge. Penn Medicine has and will continue to invest heavily in the recruitment of department and institute leaders. Despite increasing pressure on NIH funding and national concerns regarding the economic model for support of basic research at academic medical centers in the US, Penn Medicine recognizes the fundamental necessity of basic science to fuel the translational pipeline. To advance fundamental science, we will:

- **Build an intellectual community to drive highly impactful fundamental science**, by: engaging our leaders and top talent across Departments, Centers and Institutes to lead successful recruitments of transformative scientists and physician-scientists from outside and within; enriching the infrastructure and technology necessary to support fundamental investigations; and creating a cohesive and collaborative intellectual culture that fosters the engagement and advancement of these individuals.

Develop and provide innovative tools and methods for discovery

Institutions that develop and adopt novel technologies have a competitive edge to accelerate discovery and transform the biomedical research landscape. These discoveries, in turn, lead to novel diagnostic tools, innovative therapies, and improved health outcomes. There are many examples of transformative methodological approaches (e.g., high throughput sequencing/genomics, CRISPR, GFP) and instrumentation (e.g., super-resolution microscopy, mass spectrometry, cryoelectron microscopy, MRI) that have had a profound impact on biomedical discoveries and research progress. Technology development and early adoption of new approaches are key to accelerating discoveries by Penn Medicine faculty and remaining ahead of the curve in biomedical research.

Toward this end, Penn Medicine's faculty and leaders strive to incorporate the newest methods and tools into their research programs through extramural grants, internal investment of funds to Departments, Centers and Institutes, new faculty recruits, and outstanding research cores. As the pace of technology development quickens and the levels of sophistication and cost increase, it will become necessary to develop a more strategic approach to technology investment to advance cutting edge science. Therefore, we propose to invest in innovative technology development and enhance our culture of innovation at Penn Medicine, in partnership with SEAS and other Schools at Penn. To achieve this goal, we will pursue the following objectives and strategies:

- **Attract the best and brightest technology innovators**, by: recruiting senior faculty who have a substantial record in successful innovative technology and methodology development; fostering philanthropic and industry connections to advance these efforts; coalescing faculty with diverse expertise to collaboratively address challenges and opportunities in biomedical research and clinical care; and creating a cadre of trainees to become the next generation of technology innovators.
- **Support diverse careers within science tracks**, by: fostering the professional advancement of those in high technology fields who publish and receive funding primarily by collaborative endeavors or who may prefer to pursue a non-traditional academic career path.
- **Invest in cutting-edge technology for research at an early state**, to allow our scientists to access the most modern and powerful technology to advance their discoveries, by: providing the necessary support and autonomy for PSOM Core Facilities to renew and update core equipment, partnering with colleagues across the campus and the region to collaboratively support expensive and labor-intensive technologies (such as cryo-electron microscopy), supporting and encouraging our faculty to apply for extramural support for equipment and technology.
- **Develop a campus-wide approach to advance biomedical device development and to accelerate diagnostic and therapeutic technologies**, by: focusing the necessary intellectual and capital resources to facilitate the ability of teams of scientists and clinicians to develop and apply new methods of sensing, transmitting, interpreting and reporting patient data and for developing and applying new approaches for imaging, diagnosing and treating disease. These efforts will include collaborative work between SEAS, SAS, SOVM, Wharton, CHOP, PCI, SON, and other schools and the creation of Penn Health-Tech – a new campus-wide institute to foster biomedical device and technology development.

Lead in first-in-human clinical trials of novel diagnostics and therapeutics

Penn Medicine has made significant investments in the human capital and research infrastructure necessary to facilitate transition of fundamental discoveries into clinical trials and novel therapies. In the past five years, we have witnessed a greater than 30% increase in the number of clinical trials, with the greatest increase in first-in-human studies and early phase I/II clinical trials. We have also observed tremendous growth in multisite, national, and international clinical trials designed, led, and executed by Penn faculty. Groundbreaking work in cellular immunotherapies and gene therapies have advanced to promising early phase trials to treat cancer and orphan diseases. New revelations about neuroplasticity are leading to novel neuro-engineering approaches to accelerate recovery from traumatic brain injury and stroke, while a new understanding of neurodegenerative processes brings hope for development of new diagnostics and therapies for ALS, Alzheimer's and Parkinson's diseases. In parallel, new applications of sequencing technology promise to identify individuals at risk for myocardial infarction; fluorescent imaging approaches are improving precision surgery techniques; and new robotic devices offer safer and less invasive surgical treatments for cardiovascular disease.

Building upon this momentum, we have an ambitious goal to advance even more of these new agents and devices into first-in-human trials within the next 5 years. While these approaches have enormous promise for transforming health, they also carry risks of unanticipated consequences. As such, it is imperative that this work be based on rigorous preclinical research and adhere to the highest ethical and regulatory standards. With our exceptional track record of breakthrough research, our strong clinical trials infrastructure, and comprehensive regulatory environment, Penn Medicine is ideally situated to lead the nation in safe and effective first-in-human studies of new diagnostics and therapies. To meet this goal, we will enhance our infrastructure through the following key objectives and strategies:

- **Create a model centralized infrastructure to lead in first-in-human trials**, by: designing a comprehensive clinical trials operational unit; implementing an electronic clinical trials management system that interfaces with Penn Chart; revitalizing and expanding the centralized infrastructure for budgeting and financial compliance; providing real time monitoring of research conduct in an expanded centralized compliance program; leveraging and expanding the Penn Biobank in support of correlative science to identify biomarkers of on- and off-target effects, early response, and their biological mechanisms; and developing a new Investigational Drug Service cGMP facility in the new Center for Health Care Technology Building.
- **Accelerate enrollment of patients on clinical trials**, by: launching patient and physician facing IT-based platforms; leveraging behavioral economic strategies to foster provider communication about clinical trials; and partnering with philanthropic and patient advocacy groups to reduce financial barriers.
- **Build our community of investigators with a passion for clinical trials research**, by: launching a clinical trialist fellowship program; and expanding on-line education to share knowledge and enhance compliance.

Catalyze industry partnerships and new start-ups to accelerate translational research

Translating high impact discoveries to the clinic and society requires an even higher level of coordination and partnership with industry. Working together with the University, we helped to catalyze the launch

of the Penn Center for Innovation (PCI) and facilitated a PCI satellite office in PSOM, encouraging closer collaboration between technology licensing officers and PSOM faculty. With the shifting NIH funding landscape and uncertain political climate, we have also diversified Penn Medicine's research portfolio to dramatically expand our industry sponsored research and other commercial alliances. Indeed, commercialization agreements involving PSOM faculty have increased to 440 from 120 and patents filed have increased to 600 from 400 (2011 – 2016). PCI Ventures has assisted in the formation of numerous high profile start-up companies in partnership with PSOM faculty, several of which are in the process of raising substantial venture led funding rounds.

To accelerate momentum, a new Chief Innovation and Corporate Outreach Officer was hired and is now working closely with PSOM leadership and faculty to identify and new corporate partnership opportunities in strategically important areas across PSOM such as neuroscience, dermatology, cardio-metabolic disease and genomics. Further, to address advanced health care needs, it is increasingly important to connect biologic cures with the device sector. To this end, the Penn Center for Health Devices and Technology partnership between PSOM, SEAS and the University aims to further catalyze medical device innovation to improve patients' lives.

Our investments in cell and gene therapy illustrate our bold approach in this area. The 2012 Novartis partnership ushered in a new era of commercialization of cancer immunotherapy work at Penn. More recent agreements, such as the alliance with the Parker Institute for Cancer Immunotherapy (2016), involve multi-institutional partners (Penn, MD Anderson, UCLA, Stanford, UCSF and Memorial Sloan Kettering). The collaboration with Celgene (2016) provides significant R&D funding to a research consortium including Penn, Mt. Sinai, Columbia, and Johns Hopkins. Commercialization activities for Penn's Gene Therapy Program include a major multi-year alliance with Biogen (2016) across numerous therapeutic indications (eye, skeletal muscle, CNS), as well as large alliance partnerships with Janssen Pharmaceuticals and several other industry partners. To continue our momentum in advancing discovery to first-in-human trials and new cures, it is imperative that we continue to support innovation at PSOM and Penn. These efforts will elevate further Penn Medicine's reputation as an epicenter in Philadelphia for innovation and commercialization. To achieve our goals in this area, we will pursue the following objectives and strategies:

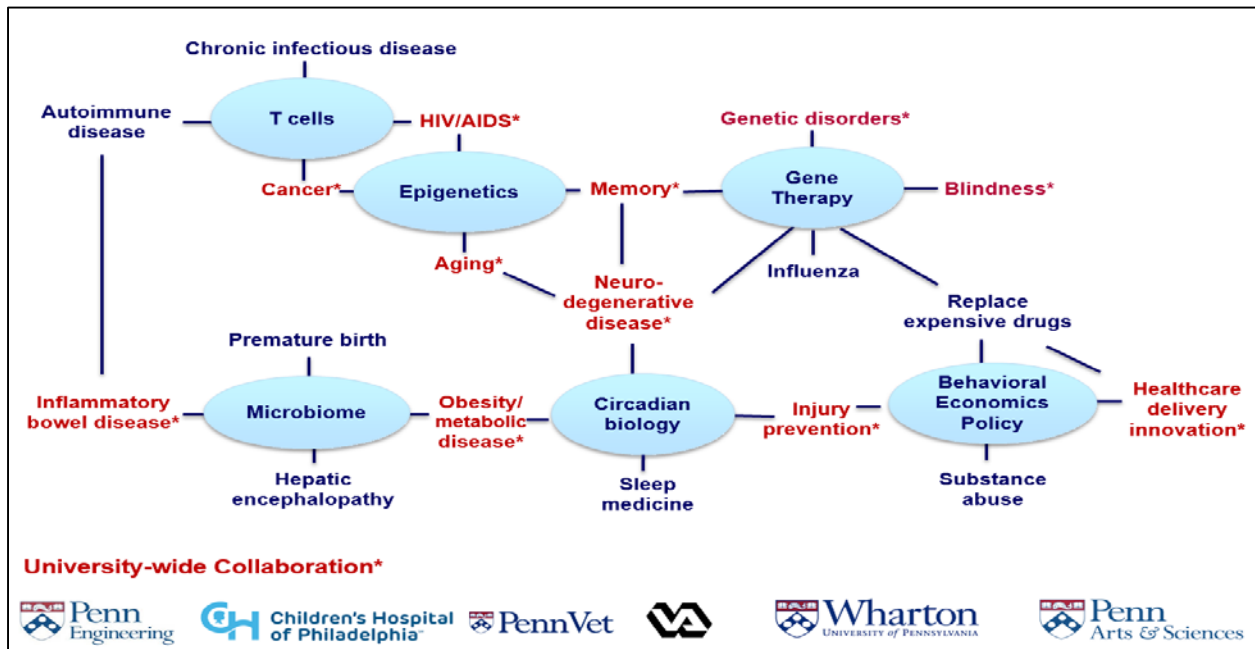
- **Continue working with the University to enhance our partnership with PCI and optimize these interactions**, by: deepening the functional working relationship between PCI and the PSOM satellite office; and working closely with the Managing Director of PCI and the Vice Provost for Research to further streamline processes to promote effective collaboration.
- **Advance new strategic commercial partnerships in partnership with PCI**, by: developing even closer collaboration between PSOM faculty and the Chief Innovation Officer and Corporate Outreach Officer; encouraging the concierge system where investigators have personal relationships with PCI staff who know their portfolios and can view discoveries in the context of a lab's work; embedding PCI licensing staff in more strategic locations; ensuring that we capture all appropriate new inventions and intellectual knowledge that may be advanced through outside partnerships; and promoting greater efficiencies with legal and regulatory processes.
- **Advance Penn's Reputation for Innovation in Partnership with PCI**, by: leveraging PCI's marketing and communications resources to brand Penn as a center for innovation in life sciences via 'the Cellicon Valley' narrative; collaborating on key industry events such as the JPMorgan Healthcare Investor Conference, the International BIO Convention, and Life Sciences

Future to create custom programs that feature PSOM faculty and start ups; co-promoting PCI's NSF funding ICorps program to faculty who want to test and de-risk their ideas before formally forming a startup or corporate partnership; and encouraging industry to leverage Penn Medicine's unique resources to advance their strategic priorities (e.g., target discovery, preclinical modeling, a diverse biobank, and clinical trials expertise).

- **Advance high priority start-up opportunities**, by: working with the University to establish a more defined communication and monitoring structure to identify the most promising opportunities; and selectively nurturing those prospects that carefully balance opportunities and risks.

Leverage talent and synergy across Penn's Departments, Centers, Schools, Wistar, VA, and CHOP

Penn Medicine has a rich tradition of world renowned Centers and Institutes. Our recent history includes the formation in 2005 of the Institute for Diabetes, Obesity and Metabolism, the Cardiovascular Institute, the Institute for Translational Medicine and Therapeutics, and Institute for Regenerative Medicine (2007). More recently we launched the Penn Center for Personalized Precision Medicine (2016) and the Penn Epigenetics Institute (2017). Investigations fostered through the broad landscape of our Centers and Institutes consistently generate high impact publications with important new insights that will impact human health. As one example, new connections between Penn's Epigenetics Institute and other disciplines such as neuroscience, cancer, and aging are opening up entirely new lines of investigation. Collaborative work linking investigators in dermatology with those studying metabolism identifies novel cellular mechanisms to promote regeneration of healthy tissue after wounding. The translation of fundamental immunobiology research into new cell and gene-based therapies is changing the paradigm of therapy for cancer, autoimmune, and infectious diseases. These are but a few examples of the groundbreaking discoveries that are facilitated every day through our Centers and Institutes, and across Penn's campus.



As we look to the future, there is a tremendous opportunity to leverage talent across Penn's physically integrated campus, as well as with our close partners, CHOP, Wistar and the VA. Advancing these linkages will enable us to solve complex problems in health and health care, beyond what one

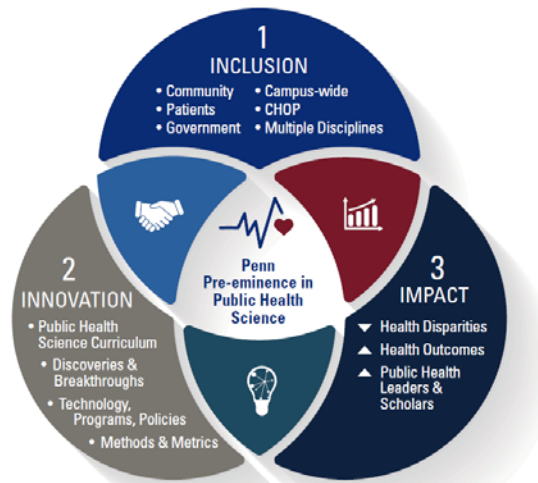
Department, Center, School or organization could accomplish on its own. These connections will foster the success of our efforts to recruit, retain and engage top talent, to accelerate cutting edge discovery, to translate science from the laboratory to patient care and to the community, and to develop innovative educational programs.

Our growing partnership with CHOP is a case in point. In recent years, we have been working to streamline administrative barriers to collaborations that strengthen both institutions. Numerous initiatives are underway. Genetics is now a unified department across both institutions. Successful joint programs include the Penn-CHOP Microbiome Program and the Penn-CHOP Center for Digestive, Liver and Pancreatic Medicine. Important research collaborations also involve ITMAT, IDOM, and the Departments of Neurology, Cancer Biology, and Emergency Medicine. These joint initiatives demonstrate that we are stronger together than apart. Strategies that promote further collaboration will catalyze societal, regional and institutional benefits.

To leverage these connections and maximize the value of our geographic proximity, we will pursue the following objectives and strategies:

- **Collaborate across schools and institutions to bring the best scientists to Penn**, by utilizing the PIK, Presidential Professorship, and other mechanisms to foster collaborative recruitments of transformative faculty. Examples of foci for the future include, but are not limited to, stem cell research with CHOP/SOVM/SEAS, biomedical device and technology development with CHOP/SEAS/SOVM/SON, comparative biology with SOVM, and neuroscience, biomedical informatics, and computational biology/genetics, with Wharton/SAS/SON.
- **Leverage Penn talent for high-impact collaborative scientific initiatives**, by: enhancing communication with faculty involvement in NIH Councils and national boards in order to anticipate RFAs for major initiatives (e.g., BRAIN initiative, Alzheimer's Disease, etc.); establishing cross-school catalyst groups in 3-4 areas of significant opportunity that build upon our existing strengths and assets; accelerating applications for major grants (e.g., P50, U01, etc.) through targeted seed funding and enhanced administrative support; and aligning strategic priorities across Schools with the goal of making collaborative investments and boosting Penn's national profile in key areas.
- **Partner with CHOP, Wistar and the VA to develop cutting-edge infrastructure**, by: identifying opportunities to invest in shared facility resources and technologies; and designing new policies and logistical operations as well as seamless administrative processes to reduce impediments to collaboration across institutions.
- **Redesign educational programs that reach across Penn and elsewhere**, by: leveraging the thematic framework of Centers and Institutes across Penn and CHOP to reimagine curricula in undergraduate and graduate medical education; and exposing our trainees to innovation and cutting-edge science as well as experiential learning across institutions.

Reduce health disparities through public health science across Penn’s campus



Responding to the *Penn Compact 2020*, Penn Medicine has strengthened and broadened a variety of community partnerships over the past several years. These include community-based health care delivery in underserved neighborhoods through such programs as Puentes de Salud, as well as interventions in schools and implementation of Penn Medicine’s Pipeline Program that creates a pathway for high school students to succeed in college and beyond. In 2013, we launched the Penn Center for Community Health Workers to advance the integration of evidence-based community health worker models into health care delivery. Its IMPaCT program has expanded to reach 2,000 patients a year and is a national model for improving the health of high-risk patients. The Cohen

Center, supported by a generous gift, provides care in West Philadelphia for veterans and their families experiencing challenges from TBI or PTSD. With new leadership of the Department of Family Medicine and Community Health and the Department of Psychiatry, we are building research excellence in population health management and creating new care models to keep our patients and our community healthy.

Building upon this progress, there is an unprecedented opportunity for Penn Medicine to bring leadership to a trans-University initiative to transform Penn’s approach to public health science and health disparities research. In doing so, we can leverage our deep expertise in genomics, environmental toxicology, behavioral and health economics, epidemiology, informatics, and community-based research. Extending the concept of precision medicine to “precision public health,” these efforts can also leverage the technology of wireless monitoring devices to collect naturalistic data on medication adherence, physical activity, exposures, and social media. By fostering synergies across Penn’s campus, we now propose to promote new Signature Initiatives in support of the *Penn Compact 2020* with a focus on moving the needle on specific health outcomes to reduce health disparities in our local community. Consistent with the National Academy of Medicine, Penn Medicine encourages efforts in local communities that represent the “front line” in the health promotion efforts. To advance public health science and the Penn Compact 2020, we will pursue the following objectives and strategies:

- **Collaborate with our University colleagues to create innovative new approaches to public health challenges,** by: leveraging the considerable talent in public health scholarship across Penn, as well as unique assets such as Pennovation, to create an impact that is greater than the sum of the parts. Recognizing the broad and daunting scope of public health problems – obesity, pollutants, addiction, violence, poverty, etc. -- we have chosen to focus on novel approaches that might be scaled and replicated, if proven successful. An overriding goal is to use these approaches to reduce disparities in health outcomes.
- **Support Signature Initiatives to improve specific health outcomes and reduce health disparities in our local community,** by: fostering multidisciplinary collaborations across campus to solve important, complex, multi-faceted health problems; supporting highly innovative community-based research initiatives in areas such as atherosclerotic cardiovascular disease, unsafe environments that increase risk for pedestrian injury, and respiratory hazards resulting from high levels of

environmental pollutants, among others; utilizing these initiatives as a template for future projects at Penn and nationally; and laying the groundwork for achieving sustainability for these projects through additional research grants and philanthropic support mechanisms.

- **Advance new tools and methods for public health and population science**, by: developing new approaches to predictive modeling of risk incorporating data on genomics, environmental exposures, and human behavior; conducting community-based innovation tournaments to foster public engagement; extending the model of rapid cycle intervention testing to the community setting; and utilizing new analytic methods for program evaluation using big data platforms.
- **Train the next generation of public health innovators**, by: redesigning existing undergraduate and graduate curricula across campus to bring a focus to population health; and linking clinical training in the health sciences on Penn's campus with research on social determinants of health, health equity, and public health science.

Extend Penn Medicine's impact worldwide through Global Health

As noted above, Penn Medicine is at its core a humanitarian organization. Whether through patient care, education, or research, our efforts in service are directed to helping people lead healthier, longer and more productive lives. It is not an overstatement to say that each of our faculty, trainees, and staff chose their careers and this institution as their professional home for this reason. Thus, extending our discoveries, innovation and impact to achieve health equity on a global scale is an essential component of Penn Medicine's moral fabric.

There are also practical reasons for more comprehensive engagement by Penn Medicine in global health. The increasing interconnectivity of our world through ease of travel and new communication streams has proven that health in one region often directly and rapidly impacts another, and has simultaneously raised awareness of disparities in global disease burdens and care: each highlighting the often-tragic need for even the most basic components of health care in many locations of the world. Aligned with these shifts, new generations of clinicians and scientists are entering the global health field in increasing numbers. Thus, our ability to attract and retain the best and brightest is at risk if we do not embrace this cultural shift. Importantly, new scientific discoveries and keys to understanding human disease also derive increasingly from studying distinctive global diseases and/or populations. Lastly, work in global health spans all of Penn's schools because geopolitics, law, business, communication, etc. all impact the provision and outcomes of health care.

Our vision for global health is to achieve health equity by utilizing the remarkable attributes, talent and resources of Penn Medicine, described throughout this strategic plan, to ameliorate disparities in the awareness, access and delivery of care. We will achieve this vision by empowering and supporting our people, by engaging trusted partners, and by advancing focused initiatives that complement Penn Medicine's existing strengths. Led by the Center for Global Health we will pursue the following specific objectives and strategies:

- **Build tomorrow's leaders in global health both at Penn and with committed regional partners**, by: establishing comprehensive, and scholarly global health training programs for Penn Medicine clinical and research trainees at all levels (UME, GME, BGS, Masters) with an eye to career development and sustainability; providing exceptional, and safe, global learning environments for our clinical and research trainees abroad; emphasizing capacity building for trainees and faculty at partner institutions from low-middle income countries via bi-directional exchange; by establishing

tuition-based programs for foreign trainees from middle-upper income countries; and fostering recruitment of talent and the development of targeted extramurally funded programs.

- **Achieve maximal global health impact and promote Penn Medicine’s excellence**, by: advancing 3-4 Global Health Imperatives (GHI) to address major global disease burdens in domains that reflect our excellence, where we are already committed to resource investment, and where we have faculty to champion the effort; linking directly to existing Penn Medicine Centers and Institutes, Departments and other Penn schools for these efforts; strengthening the GHIs launched in Oncology (2016) and mHealth technology (2017), and identifying new GHIs working with partners and funding agencies that are prepared to make investments to ensure sustainability.
- **Work cohesively with international partners to address global health disparities targeted at 2-3 regions worldwide**, by: forming Regional Centers of Engagement (RCE) that unite efforts of committed government and institutional partners with Penn Medicine’s combined mission areas; selecting programs strategically based on Penn’s current efforts and linkages to local government ministries and universities that can promote sustainable programs; enhancing faculty and trainee engagement by lowering the entry threshold and cost of global work; and offering collaborations, networks and data acquisition to seed new research projects at home and abroad.
- **Build an intellectual community with passion for and knowledge in global health**, by: empowering and supporting our trainees and faculty pursuits through workshops that highlight on-going Penn global work, career options, and administrative services; bridging departments and schools, and raising external awareness of Penn Medicine’s global efforts through co-sponsored symposia each semester; working cohesively with the Provost Office and Perry World House to promote a one-campus mission in global health; increasing the emphasis on awareness of new funding opportunities and philanthropy; and expanding relationships and bids for projects with new funding partners, such as the World Bank, Gates Foundation, and WHO.

C. Foster Inclusion, Engagement, and Professional Development

We will:

Champion a culture of inclusion, diversity, collegiality and collaboration

Enhance engagement and professional growth

Foster a culture of wellness and personal resilience

Create an environment in Penn Medicine where all faculty, students, and staff thrive

Penn Medicine’s most important strategic investment is in our diverse faculty and staff who pioneer discoveries, teach our trainees, and care for our patients. Exemplifying our commitment to a diverse and inclusive culture, we established the Office of Inclusion and Diversity (OID) in 2013 and developed an inclusion and diversity strategic plan that inspired the initiatives discussed below. In parallel, our Faculty Wellness Campaign, completed in 2016, crowd-sourced and then launched a series of creative services and programs to foster faculty wellness. To assess the impact of these programs, we launched the Physician Well-Being Index, an on-line assessment that provides individuals with immediate individualized feedback on their subjective well-being against national normative data. There are now close to 600 faculty who are regular users of this resource, tracking their well-being and accessing Penn Medicine resources for faculty development. Supplementing these initiatives, Penn Medicine Faculty

Affairs and Professional Development engages over 900 faculty members per year in innovative programming to establish a sense of community and collaboration, and to optimize faculty creativity, professional development, and satisfaction.

These advances have inspired us to make even greater progress in this area. In the coming years, we envision an environment in which our scientists, clinicians, and educators work collaboratively with executive leadership to make Penn Medicine the best place to work in the world. Across the organization, training in unconscious bias and cultural competency will enable us to build a more diverse team, reinforcing our culture of inclusion and sense of community. Innovative multi-pronged approaches to professional development and wellness will foster intellectual and personal growth, while optimizing creativity, resilience, and satisfaction. To achieve these aspirational goals, we will: champion an inclusive culture that sustains diversity; launch innovative personal and professional development programs to foster professional engagement and advancement; and drive individual and organizational change initiatives to promote wellness and resilience in a rapidly evolving biomedical research and healthcare environment.

Champion an inclusive culture that sustains diversity

Launched in 2013, the Office of Inclusion and Diversity (OID) has grown its organizational capacity to advance inclusion and diversity efforts across Penn Medicine. Since its inception, OID created the Penn Medicine Program for LGBT Health, launched the Health Disparities/Health Equity Initiative and Health Equity Week, expanded the Diversity Search Advisor program to include nearly 50 advisors, and leveraged the Presidential Professorships program to appoint a diverse group of distinguished faculty members.

Increasing diversity has been noted across the pipeline and among the ranks of standing faculty, increasing underrepresented minorities from 5% to 7%. To sustain these fragile advances, it is important that inclusion and diversity initiatives extend beyond the ranks of medical students, residents, graduate students, postdoctoral fellows and faculty. Considering that our trainees spend a significant proportion of their time within the clinical enterprise, the success of efforts to enhance inclusion and diversity take on added importance. Within the domain of patient care, Penn Medicine is also poised to reduce variation in care and enhance delivery of culturally competent care, in conjunction with our efforts to reduce health disparities. Opportunities exist to extend this capacity for increased inclusion and diversity across Penn Medicine. Building upon the experience gained by OID to date, we will pursue the following objectives and strategies:

- **Model a culture of diversity at the highest levels of the organization**, by: increasing diversity among the Penn Medicine Board of Trustees and executive leadership to better reflect the diversity of the population served by Penn Medicine; launching an inclusive leadership development program to drive the development of talent internally and to sustain efforts to build diversity in leadership; and incorporating inclusion and diversity metrics into the evaluations of Penn Medicine leaders.
- **Foster a culturally competent workplace, free of bias**, by: providing training in unconscious bias to all faculty, staff, and trainees to ensure a culture of inclusion across the mission-critical domains of education, research, and patient care; and ensuring that search committees across Penn Medicine are conducted in a fashion that generates a diverse applicant pool and an objective process free of bias.

- **Build a community of scholars to foster academic scholarship in inclusion and diversity**, by: developing the Special Interest Group for Health Disparities/Health Equity to create a community of scholars; investing in training and scholarship in social justice, cultural competency, and health equity; and fostering community-participatory research and education efforts to engage the local community our efforts.

Enhance engagement with attention to mid- and senior-level talent

Our unparalleled assets in professional development provide exceptional training and career development opportunities for our faculty and staff. Penn Medicine entities, such as Faculty Affairs and Professional Development, Penn Medicine Academy, Office of Organizational Effectiveness, OID, and the FOCUS Program for Women, offer a wide variety of programs with an emphasis on junior faculty. Notable examples include PSOM's leadership in the UPenn Pathways Program for STEM Faculty, Envisioning Later Stage of Career programs, and Teaching at the PSOM 101, an asynchronous learning course that covers best practices and recommended pedagogical strategies for teaching and providing effective feedback to trainees.

While the focus to date has been on fostering the professional development of our junior faculty and staff, we recognize the need to concentrate greater efforts on our mid- to senior-level talent as well. Within the changing landscape of academic medicine, openness to developing new skills and re-inventing oneself professionally in meaningful ways is becoming increasingly vital. This may involve adopting new research or clinical directions, and/or assuming new leadership roles in our evolving AMC. Indeed, in a recent faculty survey, 70% of respondents indicated that a reason for considering leaving Penn would be to assume new leadership roles. Years of productivity are mostly lost when our faculty or staff leave, making career advancement a critical priority for Penn Medicine to remain a high performing AMC.

As the external pressures facing clinical medicine and biomedical research continue to build, success at all ranks will also depend on the ability to work collaboratively with other colleagues, to plan strategically about the future, and to demonstrate learning agility and resilience in the face of change. Penn Medicine faculty members also place great value on their intellectual and personal growth. To promote the values that are important, we will pursue the following objectives and strategies:

- **Develop our newest talent in Penn Medicine**, by: pairing new faculty with peer navigators to foster integration into our unique organizational culture and build a sense of community; hosting small group lunches and dinners for new faculty to create connections with colleagues and administrative leaders; offering individual coaching and workshops to strengthen competencies that will foster success in the face of external pressures (e.g., grant writing, teaching, mentoring, strategic thinking, emotional intelligence, and resilience); and providing training in team building skills pertinent to running a laboratory, working in clinical care teams, or building a collaborative research initiative.
- **Advance the career evolution of junior and mid-level talent**, by: applying the science of creativity through an "Idea Labs" concept to catalyze creative thinking and new ideas; offering small group programs and personal coaching on career progression to foster self-reflection and individualized goal setting; encouraging and supporting greater involvement in teaching and other interactions with junior faculty and trainees; and developing competitive retraining or advanced training programs for faculty as they enter the later phases of their careers.

- **Develop the future Penn Medicine leaders**, by: encouraging use of term limits for leadership positions at all levels with attention to succession planning; identifying mid-level leadership talent in a proactive manner and fostering their leadership development through effective assessment, feedback and targeted training; and initiating a Penn Medicine-wide pilot initiative to foster successful integration and outcomes for new leaders of our Departments, Centers and Institutes.
- **Engage all faculty and staff in activities to promote professional and personal growth**, by: creating strategically aligned professional development programs, including a Learning Management System that enables targeted content and online access to professional development courses; and establishing a Faculty Engagement and Advancement oversight committee to drive all of these initiatives and foster integration among various professional development entities.

Foster a culture of wellness

Penn Medicine recognizes the critical importance of promoting and rewarding faculty and staff wellness. Our 2016 Faculty Wellness Campaign crowd-sourced and then launched a series of creative services and programs to foster self-care and well-being, including: lactation support, provision of take-home meals, fitness and wellness classes, and a new open, collaborative space on the top floor of the South Tower Extension. In addition, a childcare center is scheduled to open in 2018. These programs exemplify our commitment to a set of values, attitudes, and behaviors that promote self-care, personal and professional growth, and compassion and respect for colleagues, patients, and staff.

Building upon this progress, now is the time to accelerate our efforts to address faculty well-being and reduce burnout. Faculty burnout within the modern AMC has received growing national attention by the National Academy of Medicine, the Association of American Medical Colleges, and the AMA. Accumulating evidence suggests that as many as 50% of physicians across the country report burnout, as defined by loss of energy and enthusiasm for work, a sense of diminished autonomy and control, and a reduced sense of professional and personal accomplishment. Burnout, in turn, is associated with increases in medical errors, decreases in quality of care, and reductions in patient satisfaction.

Diminished wellness is not unique to clinicians, but is also observed among biomedical scientists. Indeed, morale among academic biomedical scientists has worsened significantly over the previous five years and represents an alarming national trend. Drivers of increasing stress and burnout include funding challenges as well as administrative inefficiencies. Penn Medicine recognizes that solutions to these challenges will require collaboration among leadership, departments, and individual faculty members. To address this challenge, we will pursue a two-pronged approach that emphasizes fostering wellness and resilience and promoting practice and work efficiency for faculty, trainees and staff:

- **Foster a culture of wellness and personal resilience**, by: enhancing the support of the Faculty Wellness Committee to design and promote new engagement strategies that reward self-care and wellness; providing support for the time required for individuals to participate in these activities; utilizing the Faculty Well Being Index to provide access to tailored resources and for self-assessment of improvement; and enhancing accountability for faculty among departmental and divisional leadership by incorporating these outcomes into annual and six-year departmental reviews; and engaging in random acts of kindness to mitigate environmental stresses.
- **Promote clinical practice efficiency**, by: experimenting with alternative work flows and flexible clinical scheduling; using flex time as an incentive for increased productivity; increasing the use of

physician extenders; and streamlining use of the electronic health record. These steps will ensure that all providers are working at the top of their licenses.

- **Enhance administrative efficiencies**, by: developing more efficient on-line systems that minimize time required for administrative reporting and to decrease regulatory burden (e.g., conflict of interest, progress reports, dossiers); enhancing administrative support for the development and submission of interdisciplinary and cross-departmental program and training grants (e.g., P01, P50, U, T32); and providing editorial support for protocols, grants, and papers.

D. Promote Lifelong Learning

We will:

Champion the concept of lifelong learning in each of our education programs

Catalyze interdisciplinary learning across the continuum

Leverage Penn's multiple Schools to foster inter-professional education

Lead in new educational methods including online media and experiential learning

Founded in 1765, our School of Medicine at the University of Pennsylvania was America's first. After 250 years, the PSOM is now embedded within a thriving AMC and University. However, education remains our defining mission and our programs have expanded to complement the size, scope, and quality of Penn Medicine's research and clinical enterprise. These programs include: UME (783 MD students); the Medical Scientist Training Program (189 MD/PhD students); 79 ACGME accredited Residency Training Programs (1300 residents and fellows); the Biomedical Graduate Studies Program (608 PhD students); and the Biomedical Post-doctoral Program (662 post-doctoral fellows). We also lead our peers in providing opportunities for interdisciplinary learning, with more than 60% of MD students achieving additional degrees or certificates. In addition, our CME program allows physicians and health care professionals from across the world to stay abreast of the latest techniques, procedures and research.

Across this continuum of UME, GME, and CME, Penn Medicine has been in the vanguard of medical education reform. Our innovative curriculum and integrated approach emphasize the acquisition of self-directed learning skills, team learning, and the use of state-of-the-art learning technologies, including simulation and a growing portfolio of online educational programs. Building on our experience with Coursera, in 2016 we made a significant entry into the online education space with the introduction of an online course offering a Certificate in Health Care Innovation by the Department of Medical Ethics and Health Policy. With this program, Penn extends its unique set of faculty expertise in health policy, behavioral economics, and operations management to mid-career professionals in order to transform the way health care is delivered. Further, we continue to expand open learning for and from Penn. Building on the successful launch in FY 17 of two online 3D anatomy courses (The Thorax and Embryology of Heart and Lungs), we are implementing multiple new on-line courses on the EdCast and Coursera platforms.

We have also expanded our inter-professional education efforts in recent years. With the School of Nursing and UPHS nursing leadership, we received approval for joint accreditation to provide CME/CNE Inter-professional Continuing Education (IPCE) at Penn. We also advance the model of inter-professional education (IPE) through a broad range of regularly scheduled series, such as Grand Rounds, Case Conferences, Morbidity & Mortality Conferences, Tumor Boards, Quality Conferences, and Journal Clubs. Additional efforts to advance team learning include: developing and implementing IPE programs for primary care teams on improving communication skills; implementing programs through Faculty

Development in how to teach teams in an IPE setting; implementing IPE programs in opioid training for faculty around acute and chronic pain management; and developing and implementing a program that hosts the top 100 regularly scheduled series across multiple disciplines for all faculty (clinicians and nursing) and staff in Penn Medicine.

These efforts have been greatly facilitated by the opening of the Jordan Medical Education Center (JMEC) in 2015. Supported by a \$40 million gift, JMEC is among the first medical education facilities in the nation to fully integrate advanced education facilities and technologies with active clinical care and research lab space. To increase access to our progressive Penn Medicine education environment, in FY 17, we awarded \$16.2M in scholarships for UME, with 61% of our MD students awarded support and 133 of 477 students receiving full scholarships. Significantly, this placed us in the 90th percentile for all medical schools, according to the latest Financial Aid Summary Report (FASR) compiled by the AAMC. Students in the Class of 2017 graduated with an average debt of \$122,850, appreciably less than the national average of \$189,165 in FY 15-16.

The high caliber of our medical education program has been recognized by our receipt in 2016 of accreditation from the LCME through 2024 and a consistent top 5 ranking by *U.S. News and World Report*, advancing to #3 in 2016.

- **Build the educational programs for the future.** Consistent with our leadership in medical education innovation, the new Senior Vice Dean will lead a planning effort to reimagine and adapt medical education for the future. Leveraging our investments in JMEC, our robust scholarship support, and aligned education assets in our PhD and Master's programs, this is an ideal time for a comprehensive evaluation of our medical education curriculum. As reflected in our recent LCME review, our current education programs are outstanding and have evolved continuously since a major reform in 2000. Nonetheless, the daunting growth of information relevant to pathophysiology, diagnostic testing and differential diagnosis, and available treatments creates significant challenges for new learners as well as practicing clinicians. It is also important to recognize changes in the learning habits of students and to capture their enthusiasm for new modes of learning including online media and video, group dynamics and inter-professional education, simulation, entrepreneurship, and experiential learning. As noted above, a majority of PSOM students seek additional degrees and certificates, reflecting their interests in leadership and multiple disciplines. Assuming a start date in 2018, we anticipate completing this review and planning process by 2020.
- **Integrate educational programs across the continuum of life-long learning.** Our current portfolio of education programs (Master's, BGS, MD/PhD, UME, GME, CME) relate to multiple disciplines, as well as different stages of learning. These programs also engage multiple different organizational entities (PSOM, UPHS, CHOP, VA, University, LGH, etc.). A newly created Education Council, led by the SVD for Medical Education will provide a coordinating structure to ensure optimal alignment of these programs, promote communication among the programs, and mediate financial transactions, when appropriate.
- **Reimagine graduate education in the biomedical sciences.** Since its founding in 1984, the Biomedical Graduate Studies (BGS) program has thrived as an integrated graduate program in the life sciences. Though largely based at the PSOM, these PhD programs engage faculty at multiple Penn Schools (e.g., SAS, SVM, SON, SDM) as well as the Wistar Institute and Fox Chase. Somewhat analogous to medical education, the forces shaping biomedical research are changing rapidly, and it is timely to review the organization and curriculum of BGS. A new Director, Kelly Jordan-Sciutto, was appointed in 2017, and will engage a task force in this review, with a goal of completing its work

before start of 2019. Because the MSTP program spans both UME and PhD programs, its stakeholders will be included in both review process to ensure coordination of its unique requirements.

- **Establish a new Innovation Center for Online Medical Education.** This Center, to be led by Dr. Gail Morrison, will develop new methods of individualized content delivery using video, simulation, MOOCs, and technologies of the future. Leveraging our investments in a new media center, as well as the University's prioritization of online learning in multiple Schools and disciplines, we will be an early mover in an area that is ripe for leadership. Medical education is expensive and the efforts of schools throughout the U.S. and the rest of the world are partially redundant and of variable quality. We will leverage the talents of our faculty and the innovative education environment at Penn to explore new models of disseminating knowledge, reducing the costs of medical education, and generating financial support for online learning.
- **Enhance trainee wellness and development of competencies that promote personal and professional development (e.g., resilience, emotional intelligence, change management).** Growing awareness of physician burnout and stress among medical students, residents, and PhD students, and post-docs underscores the importance of developing effective coping skills and lifestyle management throughout the continuum of learning. In parallel with our focus on faculty and staff wellness, we will tailor programs for trainees in these different environments to optimize their learning, habits, and experience at Penn. A goal is not only to implement these programs but also to share our experience with other institutions through various professional organizations such as AAMC.

Appendix A: Notable Accomplishments (2012-2017)

Shaping the Future of Medicine (2012-2017), outlined six strategic priorities:

- Lead in Delivering Individualized Medicine*
- Realize Penn Medicine's Potential for Innovation*
- Enrich the Life of Our Faculty through Diversity and Flexibility*
- Impact Outcomes Locally and Globally*
- Create Innovative Interdisciplinary Educational Programs*
- Optimize Performance of the Penn Medicine Ecosystem*

Strategic Investments in each of these domains have propelled significant momentum across all mission areas. Notable accomplishments include:

Lead in Delivering Individualized Medicine

- **Growth in precision medicine:** Launched in 2013 as a collaborative effort between the Department of Pathology and Laboratory Medicine and the Abramson Cancer Center, the Center for Personalized Diagnostics (CPD) offers precision diagnostics through the integration of molecular genetics, pathology informatics, and genomic pathology. Precision testing identifies patients who might benefit from current, often cutting-edge therapies, while sparing others the side effects and costs of therapies that are unlikely to be efficacious for them. To further accelerate progress in this burgeoning field, we established the Penn Center for Precision Medicine (CPM) in 2016. Through its interdisciplinary governance structure and Accelerator Fund Program, the CPM is catalyzing transformative science to bring precision medicine into every day patient care, and improve clinical outcomes for a lasting impact on health.

Realize Penn Medicine's Potential for Innovation

- **Reinvention of tech transfer:** Working together with the University, we catalyzed the launch of the Penn Center for Innovation (PCI) and opened a satellite office in the Perelman School of Medicine, allowing closer collaboration between technology licensing officers and faculty. Nearly 500 Penn Medicine faculty have participated across numerous PCI programs. Results (2011 – 2016) demonstrate considerable momentum -- commercialization agreements have increased to 440 from 120; patents filed increased to 600 from 400; clinical trial activity increased to more than 1000 active studies, from 400. This latter result was greatly facilitated by implementation of a best-practices clinical trial process, including risk management, under the leadership of Emma Meagher.
- **Penn Medicine Center for Healthcare Innovation:** Launched in 2012 to support faculty and staff in their efforts to design, test and implement new approaches to improve health care delivery and patient outcomes, PCHI has fostered a culture of experimentation and entrepreneurship at Penn Medicine. To date (2016), its Innovation Accelerator Program has received nearly 300 proposals and funded 21 projects, ranging from antibiotic stewardship, to increasing completion of and compliance with advance directives, to IMPaCT, a leading, evidence-based community health worker program for vulnerable populations.

- **Creation of the Institute for Biomedical Informatics (IBI):** Created in 2014, the IBI has significantly enhanced the informatics ecosystem at Penn, supporting basic and clinical research and clinical care. Since its inception, IBI has grown to include 57 affiliated faculty members from PSOM as well as SAS, Engineering, Nursing, Veterinary Medicine and Wharton. At the same time, the IBI Bioinformatics Core is supporting research with Big Data in the Abramson Cancer Center, the Center of Excellence in Environmental Toxicology, the Penn Epigenetics Program, and CHOP, as well as individual faculty investigators throughout PSOM.
- **Penn Medicine Biobank (PMBB):** The PMBB coordinates the recruitment of Penn Medicine patients under a universal IRB protocol, including consenting, obtaining of specimens (blood, and in some cases tumor tissue), sample processing, sample storage, sample annotation, generation of genomic data, distribution of samples for research, access to EHR phenotype data through the Penn Data Store. The PMBB also obtains permission to recontact participants for additional studies, to enable longitudinal investigation of clinical outcomes. By 2017, over 45,000 patients had been enrolled, making PMBB one of the top 5 academic biobanks by size in the US. In addition, more than 10,000 participants (23.7%) are African-American, the largest representation of AAs in an academic biobank in the US.
- **Microbiome program:** Established in 2014, the Penn/CHOP Microbiome Program investigates new ways to improve health by manipulating microbial populations. Its innovative core facilities include the Microbiome Sequencing Center at CHOP, the Gnotobiotic Mouse Core, the Microbial Culture and Metabolomics Core, the Microbiome Human Intervention Core, and the Acute Care Biobanking Core. Results include a growing number of papers published in top-tier journals (31 publications across 23 journals, 2014-2016), and a burgeoning grant portfolio that exceeds \$40M.
- **Major commercialization partnerships:** The 2012 Novartis partnership, which has invested more than \$200M in our cancer immunotherapy program, catalyzed a new era of commercialization at Penn. Recent agreements, such as the \$250M alliance with the Sean Parker Institute for Cancer Immunotherapy (2016), involve multi-institutional partners (Penn, MD Anderson, Stanford, UCSF and Memorial Sloan Kettering). The collaboration with Celgene (2016) in cancer research provides up to \$300M in R&D funding to a consortium of Penn, Mt. Sinai, Columbia and Johns Hopkins. Commercialization activities in the Gene Therapy Program include a potential \$2B multi-year alliance with Biogen (2016) across numerous therapeutic indications (eye, skeletal muscle, CNS), as well as alliances with Janssen, Johnson & Johnson and other industry partners.
- **Research funding and impact:** From 2011-2017, annual sponsored research awards grew from \$583M annually to \$685M. Over that period, the number of high-impact papers published in top-tier journals increased from 220 to 408. Over the past five years, 16 faculty members have been elected to the National Academy of Medicine and six members to the National Academy of Science. Foreshadowing future success, Penn ranked 8th in the Nature Index 2016 of Rising Stars, which identifies ascendant scientists showing the most significant growth in high-quality research publications.

Enrich the Life of Our Faculty through Diversity and Flexibility

- **Promote Diversity and Inclusion:** To accelerate our efforts in this domain, we established the Office of Inclusion and Diversity (OID) in 2013. We have accelerated the recruitment and retention of diverse faculty and reaffirmation of the benefits of an inclusive culture. Representative accomplishments include: completion of a diversity engagement survey and development of a strategic plan; establishment of the Penn Medicine Program for LGBT Health; launch of the Health Disparities/Health Equity Initiative and Health Equity Week; expansion of Diversity Search Advisor program to include nearly 50 advisors; and leveraging the Presidential Professorships program to appointment four distinguished faculty members. Between 2011-2016 URM representation on the Standing Faculty rose to 7% from 5%; representation of women rose to 32% from 28%. This positive movement will inspire us to further progress. Significantly, GME URM's increased by 30% and 50% for the last two years.
- **Enhancing faculty and staff wellness:** To enhance faculty life, we completed a Faculty Wellness Campaign in 2016, which crowd-sourced a series of initiatives, including lactation support, provision of take-home meals, and other programs and services complementing a faculty lounge, which opened on the top floor of the South Tower Extension in February 2017. In addition, a childcare center to be operated by Bright Horizons has been planned and is scheduled to open in 2018 in a new Center for Technology administration building on the Pennsylvania Hall site. At the same time, we have addressed issues of faculty burnout through use of the Physician Behavioral Wellness Index, an objective, anonymous, online self-assessment of well-being that provides immediate individualized feedback, including comparison to physicians nationally, and access to just-in-time information to help promote well-being as well as resources for physical, emotional, and mental health concerns. To date (November 2016), 539 Penn faculty have completed the PBWI and accessed the resources.
- **Academy of Master Clinicians:** To recognize and celebrate the contributions of exceptional clinicians, we launched the Academy of Master Clinicians in 2013 and have inducted more than 50 individuals who constitute a cadre of exceptional role models and mentors.

Impact Health Outcomes Locally and Globally

- **Global Impact:** Formation in 2015 of the Center for Global Health has strengthened the global health community at Penn and is advancing care and research focused on reducing current and growing global disease burdens and accelerating the pace of biomedical innovation in under-resourced settings. Regional centers of engagement are located in Africa (Botswana and Rwanda), in Latin America (Guatemala, Costa Rican and Peru and in the USA (Philadelphia), with plans to create a new effort in Asia (India).
- **Community Impact:** We have strengthened and broadened community partnerships, including community-based health care delivery in underserved neighborhoods through such programs as Puentes de Salud, as well as interventions in schools, and implementation of Penn Medicine's Pipeline Program creating a pathway for high school students to succeed in college and beyond. In 2013, we launched the Penn Center for Community Health Workers to advance the integration of

evidence-based CHW models into healthcare delivery. Its IMPaCT program has expanded to reach 2,000 patients a year and is a national model for improving the health of high-risk patients. Creation of a Center for Community and Population Health within the Department of Family Medicine and Community Health is also expanding research activities in population health management and new models for transitions of care.

Create Innovative Interdisciplinary Educational Programs

- **Jordan Medical Education Center:** The \$40 million JMEC opened in 2015 and is among the first medical education facilities in the nation to fully integrate education facilities with active clinical care and research lab space. JMEC's state-of-the-art technology and location adjacent to the Smilow Translational Research Center and the Perelman Center for Advanced Medicine keeps us at the forefront of medical education. We lead our peers in providing opportunities for interdisciplinary learning, with more than 60% of MD students achieving additional degrees or certificates. Further benchmarks of the high caliber of our medical education program include: receipt in 2016 of full (8 year) accreditation from the LCME through 2024; and consistent top 5 ranking by *U.S. News*, advancing to #3 in 2016.
- **Online learning:** The launch in 2016 of an online course offering a Certificate in Health Care Innovation by the Department of Medical Ethics and Health Policy marked a significant entry into the online education space. Additionally, we began offering online 3D anatomy courses on the thorax and the embryology of the heart and lung, with courses on the abdomen, pelvis, back, extremities, and brain scheduled for 2017.
- **Affordability and access:** We have made significant strides in providing access to a Penn medical education. While tuition rose from \$50,000 to \$60,000, 2011 to 2016, increased scholarship support meant that student debt declined to \$118,000 from \$125,000 (compared to a mean for private medical schools of \$193,000).

Optimize Performance of the Penn Medicine Ecosystem

- **Campus renewal and capital investments:** Through balanced capital investments, we have expanded and renovated facilities in all mission areas. The 531,000 sf Smilow Translational Research Center opened in 2011, physically integrating our research and patient care activities. In 2015 we opened the Jordan Medical Education Center, as well as a new pavilion at Penn Presbyterian Medical Center. In 2016 the Center for Advanced Cellular Therapeutics, supporting our cancer immunotherapy program, opened in the South Tower Extension. Renovations to the Richards Building (2016) and Stemmler Hall (to be completed in 2018) are providing upgraded research space. The demolition of the Penn Tower in 2016 paved the way for construction of HUP's New Patient Pavilion, a \$1.5B project that will be the largest capital project in the University's history.
- **Regional expansion of UPHS:** We have enhanced access and expanded our regional footprint through alliances with the Chester County Health System, Lancaster General Hospital, Virtua, and the pending alliance with Princeton Health Care System. This has also provided additional training

opportunities for residents and students and facilitated expansion of clinical trials. Health system growth has also included opening new outpatient facilities in Washington Square (2013) and University City (2014), as well as Valley Forge, Cherry Hill, Radnor, and Parkesburg. From 2011 to 2016 health system assets doubled from \$4B to \$8B. An operating margin, which supports our research and teaching missions of \$200M (4%) increased to \$419M (7.4%), with a five-year mean of \$282M (6.7%). Over the same period, adjusted admissions grew to 225,000 from 130,000 and PSOM revenue increased from \$930M to \$1.06B. The PSOM endowment grew to \$1.5B from \$1.1B and philanthropy increased to \$213M from \$178M, with an annual mean of \$171M and a five-year total of \$1B.

Appendix B: Executive Planning Council and Work Groups²**Executive Planning Council**

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Jonathan Epstein, MD
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Caryn Lerman, PhD
Kevin Mahoney
Christopher Masotti, CPA, MBA

Leveraging Health Data

Jason Moore, PhD Co-chair
Michael Restuccia, MBA Co-chair
Yong Chen, PhD
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Blanca Himes, PhD
J.T. Howell, MD
Chad Johnston, MBA
Charles Khan, MD, MS
Kevin Mahoney, MBA
Christopher Masotti, CPA, MBA
James Metz, MD
Daniel Rader, MD
Michael Ripchinski, MD, MBA
Mitchell Schnall, MD, PhD
Brian Wells, MBA

Health Care Value

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Dan Polsky, PhD, MPP, Co-chair
Linda Aiken, PhD, RN (SON)
Patrick J. Brennan, MD
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Roy Rosin, MBA
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²A Reimagining Education Work Group will be convened following the recruitment of the SVD for education.

Mitchell Schnall, MD, PhD
Courtney Schreiber, MD, MPH
Christian Terwiesch, PhD (WS)
Rachel Werner, MD, PhD

Innovative Tools and Methods for Discovery

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John Detre, MD
Benjamin Garcia, PhD
Joshua Gold, PhD
Mark Greene, MD, PhD
Klaus Kaestner, PhD
Kristen Lynch, PhD
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Jenna Roberg, MSW, CNP
Jenna Ruttkay, MSOD
John Wherry, PhD

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Kara Freeman
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Abi Ramachandran
Alex Warshauer