

A vibrant, abstract illustration of a landscape. In the upper left, a large orange circle represents the sun. The background is composed of various colored, organic shapes in shades of pink, blue, purple, and green. In the foreground, there are green, leafy hills. A tree with a green canopy and a brown trunk stands in the middle ground. To the right, a brown building with a tiered roof and arched windows is visible. Inside one of the arches, a small black silhouette of a person is visible. The year '2019' is written in the top right corner.

2019

# Annual Report

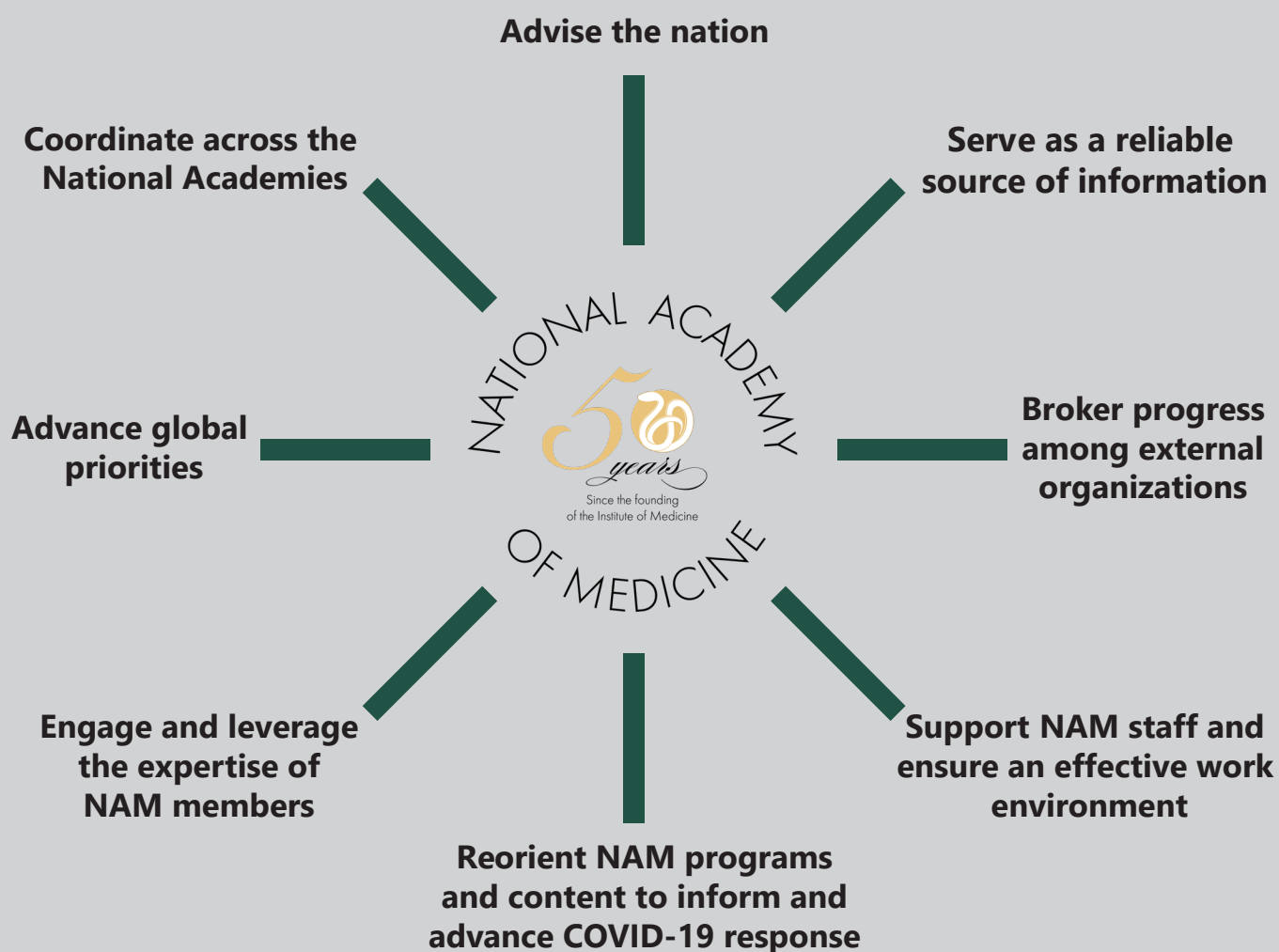


NATIONAL  
ACADEMY  
*of* MEDICINE

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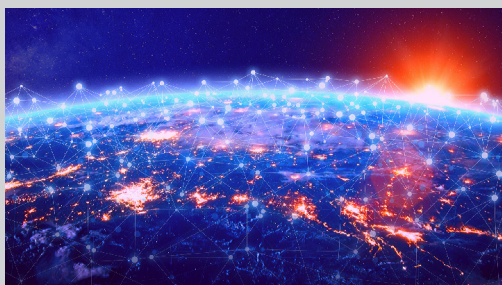
## **Responding to the COVID-19 Pandemic**

As this document entered its final stages of production, coronavirus disease (COVID-19) began to spread around the world—quickly becoming the most destructive pandemic in a century. The National Academy of Medicine quickly initiated a short-term reorientation of its existing programs to respond to the diverse and far-reaching health impacts of the pandemic, including in the areas of equity, workforce, aging, vulnerable populations, health system strengthening, and scientific and technological innovation. An “impact map” that guides the NAM’s role and priorities with regard to the COVID-19 response appears below.





Highlights of the NAM and the broader National Academies' response to date appear below. For a complete list of COVID-19 resources and activities, visit [NAM.edu/coronavirus](https://nam.edu/coronavirus).



## Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats

At the request of the Office of Science and Technology Policy and the Office of the Assistant Secretary for Preparedness and Response, the National Academies convened an expert standing committee to advise on science and policy issues related to COVID-19. The committee has delivered rapid expert consultations on topics including transmission, testing, treatment, and more.



## COVID-19 Conversations: A Scientific Webinar Series from the NAM and the American Public Health Association

This weekly series explores the state of the science on the COVID-19 outbreak in the United States and globally, with a focus on the emerging evidence on how to best mitigate its impact. Topics include the science of social distancing, treatment, crisis standards of care, testing, and more. Learn more at [COVID19Conversations.org](https://COVID19Conversations.org).



## Resources to Support the Health and Well-Being of Clinicians During the COVID-19 Outbreak

Even before the COVID-19 outbreak, many clinicians faced burnout, as well as stress, anxiety, depression, substance abuse, and even suicidality. The current crisis presents even greater workplace hardships and moral dilemmas likely to exacerbate existing challenges. The NAM Action Collaborative on Clinician Well-Being and Resilience has compiled resources and strategies to support clinicians during the COVID-19 pandemic. Learn more at [NAM.edu/CW](https://nam.edu/CW).



**We have commenced an important year of reflection and celebration to mark the 50th anniversary of the founding of the Institute of Medicine (IOM).<sup>\*</sup> In the two-part theme we have adopted for our commemorative activities—*Celebrating a legacy of impact. Forging a healthier future*—the latter half is most important. This is no time to rest on our laurels. We must turn our focus to the critical challenges of the future.**

That is why our anniversary activities include a symposia series to examine priorities for the next 50 years in health and medicine, as well as the kickoff of a major capital campaign to support new efforts in healthy longevity, global health equity, artificial intelligence and big data, and fostering the next generation of leaders. For more on our plans, see page 9.

The year ahead will also mark 5 years since the IOM's reconstitution as the National Academy of Medicine (NAM), a historic shift that yielded greater autonomy and expanded leadership within the National Academies of Sciences, Engineering, and Medicine. As part of this transformation, NAM members voted in their first-ever elections for governing officers, including Home Secretary, Foreign Secretary, and President. In January 2020, it was a tremendous honor to be elected for my second term as NAM President, after having been appointed as IOM President in 2014. I am humbled and grateful for a continued opportunity to serve this uniquely impactful organization.

In 2019, we also continued progress toward our 5-year Strategic Plan (available at [NAM.edu/2018StrategicPlan](https://nam.edu/2018StrategicPlan)). The plan sets out three overarching goals for the Academy: 1) actively identify and address critical issues with balanced and authoritative scientific evidence; and lead and inspire action on bold ideas to impact science,

medicine, policy, and health equity domestically and globally; 2) diversify and activate the membership of the Academy and engage emerging leaders and scholars to enhance our leadership capacity and



address new contexts and challenges; and 3) build leadership capacity across diverse disciplines to shape the future of health and medicine.

The first of these strategic goals sustains our foundational role as a trusted, evidence-based advisor to decision makers in the United States and abroad. Our long-term advisory programs—including the Leadership Consortium for a Value & Science-Driven Learning Health System; the Culture of Health Program; the Action Collaborative on Clinician Well-Being & Resilience; and the Action Collaborative on Countering the U.S. Opioid Epidemic—all gather multidisciplinary stakeholders to advance solutions to some of the most important challenges for U.S. health and health care.

<sup>\*</sup>As of May 2020, the NAM's planned anniversary activities have been shifted to 2021 as a result of the COVID-19 pandemic.

In addition, we launched two new initiatives to address emerging challenges. In May, following news that a Chinese scientist had edited the genomes of twin baby girls against the recommendations of the international scientific community, we established the International Commission on Clinical Use of Heritable Human Genome Editing alongside the National Academy of Sciences (NAS) and the United Kingdom's Royal Society. Building on resources from the NAM-NAS Human Genome Editing Initiative, the Commission will issue a fast-track report delineating the state of the science with regard to clinical applications of human germline genome editing. Due for publication in summer 2020, the report will inform the recommendations of the World Health Organization's Expert Advisory Committee on Developing Global Standards for Governance and Oversight of Human Genome Editing (chaired by outgoing NAM Foreign Secretary Peggy Hamburg).

Another issue of urgent global concern is the rapid aging of the world's populations. In just 30 years, 1 in 6 people will be over the age of 65. Innovation across sectors is crucial to promote the health, well-being, and productivity of older adults—as well as to ensure the sustainability of our health systems, the vibrancy of our communities, and the stability of our economies. To that end, in October 2019, the NAM launched the Healthy Longevity Global Grand Challenge. The Grand Challenge has two components—a first-of-its-kind global competition to accelerate multidisciplinary research and innovation through a series of monetary prizes and awards; and the Global Roadmap for Healthy Longevity, an international effort to assess the opportunities and challenges presented by population aging and provide evidence-based guidance for national and regional leaders. We expect important milestones for both components in the year ahead; see page 24 for more information.

Our second strategic goal relates to strengthening leadership capacity within our Academy and its networks, including NAM members as well as the next generation of leaders in health, medicine, and biomedical science. In 2019, we significantly expanded our Emerging Leaders in Health and Medicine (ELHM) program, hosting the inaugural Emerging

Leaders Forum in July. Planned by appointed ELHM Scholars, the Forum gathered approximately 70 exceptional early-career professionals and 30 NAM members for an inspiring two days of networking, mentoring, and interdisciplinary collaboration. Continuing the development of the ELHM Program as well as other NAM fellowships and leadership programs will be a significant focus of our upcoming capital campaign.

Finally, our third strategic goal looks beyond our Academy to focus on preparing our field for a future in which rapid advances in science and technology require increasing disciplinary convergence and vigilance with regard to their social and ethical implications. In January 2020, we hosted the first meeting of the Committee on Emerging Science, Technology, and Innovation (CESTI). The program will bring together experts in diverse fields to assess the landscape of emerging scientific advances and technologies in health and medicine and address the potential societal, ethical, legal, and workforce implications of such technologies, with the goal of developing a multisectoral governance policy framework.

In addition to these programs and special activities related to the IOM/NAM 50th Anniversary, exciting announcements are in store for the year ahead, including the publication of the Future of Nursing 2030 consensus report; the kickoff of the Healthy Brains Financing Initiative, a historic effort to improve global mental health; and the launch of a crucial new program examining the intersection of climate change and human health.

Since its founding 50 years ago, our organization has stayed true to its mission of seeking evidence-based solutions to the challenges that matter most for society. Our work would not be possible without the unmatched expertise and volunteer spirit of our members, the energy and dedication of our staff, the generosity of our donors, or the vast knowledge brought to bear by the broader National Academies network. Thank you all, and cheers to a productive year ahead.



**Victor J. Dzau, MD**

President  
National Academy of Medicine

## 2019–2020 GOVERNING COUNCIL

**Victor J. Dzau, MD**

*Chair*

President, National Academy of  
Medicine

**Jane E. Henney, MD**

*Home Secretary*

National Academy of Medicine

**Margaret A. Hamburg, MD**

*Foreign Secretary*

National Academy of Medicine

**J. Sanford (Sandy) Schwartz,  
MD**

*Vice Chair*

Leon Hess Professor of Medicine,  
Health Management and  
Economics, Perelman School  
of Medicine and Wharton  
School of Business, University  
of Pennsylvania

**Jeffrey R. Balser, MD, PhD**

President and CEO, Vanderbilt  
University Medical Center  
Dean, School of Medicine,  
Vanderbilt University

**Claire Brindis, DrPH**

Caldwell B. Esselstyn Chair in  
Health Policy Studies; Director,  
Philip R. Lee Institute for Health  
Policy Studies; Professor of  
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Warren P. Knowles Professor of  
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and Department of Medical  
History and Bioethics, School  
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Dean Emeritus and

Distinguished Professor of  
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Iowa

**Angela Diaz, MD, MPH**

Jean C. and James W. Crystal  
Professor of Adolescent Health,  
Department of Pediatrics and  
Department of Preventive  
Medicine, Icahn School of  
Medicine at Mount Sinai

**Linda P. Fried, MD, MPH**

Dean and DeLamar Professor  
of Public Health, Joseph L.  
Mailman School of Public  
Health, Columbia University  
Professor of Epidemiology  
and Medicine; Senior Vice  
President, Columbia University  
Medical Center

**Elena Fuentes-Afflick, MD,  
MPH**

Professor of Pediatrics; Vice Dean  
for Academic Affairs, University  
of California, San Francisco

**Eve J. Higginbotham, MD, SM**

Vice Dean, Inclusion and  
Diversity; Senior Fellow,  
Leonard Davis Institute of  
Health Economics; Professor  
of Ophthalmology, Scheie  
Eye Institute, Perelman School  
of Medicine, University of  
Pennsylvania

**Raynard Kington, MD, PhD**

President, Grinnell College

**Story Landis, PhD**

Scientist Emeritus, National  
Institute of Neurological  
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Professor of Pediatrics, Harvard  
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**E. Albert Reece, MD, PhD,  
MBA**

Executive Vice President for  
Medical Affairs, University of  
Maryland

John Z. and Akiko K. Bowers  
Distinguished Professor and  
Dean, University of Maryland  
School of Medicine

**Christine E. (Krick) E.  
Seidman, MD**

Investigator, Howard Hughes  
Medical Institute

T.W. Smith Professor of Medicine  
and Genetics, Harvard Medical  
School, Brigham and Women's  
Hospital

*Note: This list is accurate through June 30, 2020*



## ORGANIZATIONAL CHART





# The IOM/NAM 50th Anniversary Celebration

## Celebrating a legacy of impact. Forging a healthier future.

The National Academy of Medicine was founded in 1970 as the Institute of Medicine under the congressional charter of the National Academy of Sciences to provide independent, evidence-based health advice to the nation at a time of rapid social change. In the ensuing decades, the IOM/NAM established an enduring reputation as a trusted and influential advisor with, as the *New York Times* put it, the power “to transform medical thinking around the world.”

Among its many historic impacts, the IOM/NAM established the public health research agenda for HIV/AIDS; catalyzed the quality and patient safety movement in U.S. health care; established dietary reference intakes for Americans; upheld the safety of childhood vaccinations; helped shape the implementation of the Patient Protection and Affordable Care Act; and advised global organizations’ response to outbreaks of Ebola and Zika. In 2017, the NAM debuted a new mission statement: *To improve health for all by advancing science, accelerating health equity, and providing independent, authoritative, and trusted advice nationally and globally.*

Throughout 2020, we will highlight examples of the IOM/NAM’s impact in the past half-century and thank the members, volunteers, sponsors, and staff who make our work possible.\* As we celebrate our legacy, we will also examine the critical challenges of the future and redouble our commitment to serve the health of the public for decades to come.

Highlights of activities planned for the anniversary year include:

- “The Next 50 Years in Health and Medicine” regional scientific symposia series
- *Toward a Healthier Future: A History of the National Academy of Medicine* (edited by Evelyn Hammonds, Howard Markel, David Rosner, and Rosemary Stevens; forthcoming)
- *Advancing Human Health: Celebrating 50 Years of Discovery & Progress* (coffee table book; forthcoming)
- Celebratory 50th Anniversary Gala and special scientific symposium

For more information, visit [NAM.edu/50years](https://nam.edu/50years).

\*As of May 2020, the NAM’s planned anniversary activities have been shifted to 2021 as a result of the COVID-19 pandemic.





## Program Highlights

Three core priorities guide the NAM's work: 1) responding to critical and pressing issues; 2) advising the nation and the world on health and health care; and 3) leading and inspiring for the future. In the sections that follow, learn about our recent progress toward each of these goals.





# Confronting the U.S. Opioid Epidemic

**Since the launch of this one-of-a-kind public-private partnership in 2018, the Action Collaborative on Countering the U.S. Opioid Epidemic has gathered significant momentum toward elevating evidence-based solutions and catalyzing action to reverse the deadly trends of the U.S. opioid epidemic.**

The United States is in the throes of a devastating opioid addiction crisis—the deadliest addiction crisis of our time. The epidemic continues to impact individuals, families, and communities across the country, and will have a lasting impact on generations to come. Drug overdose is currently the leading cause of accidental death in the U.S., with an estimated 130 Americans dying every day from an opioid overdose. Extensive and multifactorial in nature, the epidemic will require a multi-sectoral and multi-pronged response to be successfully overcome; no organization, government agency, or sector can solve this crisis on its own.

Recognizing the need for a cohesive and collaborative response to the nation's opioid epidemic, the NAM established the Action

Collaborative on Countering the U.S. Opioid Epidemic in 2018 as a 2-year, public-private partnership to foster greater coordination and collective action across the health system and beyond in addressing the opioid addiction crisis. The Action Collaborative uses a systems approach to convene and catalyze public, private, and non-profit stakeholders to develop, curate, and disseminate multi-sector solutions designed to reduce opioid misuse, and improve outcomes for individuals, families, and communities affected by the opioid crisis. The Action Collaborative is co-chaired by the NAM, the Office of the Assistant Secretary for Health at The U.S. Department of Health and Human Services, HCA Healthcare, and the Aspen Institute, and includes participating members from across

the public, private, and non-profit sectors, including individuals with lived experience.

In its first year, the Action Collaborative has made an important and unique contribution in convening and aligning over 60 key players and entities within the health system to address some of the highest-priority elements of the nation's response to the opioid crisis, including: health professional education and training; pain management guidelines and evidence standards; prevention, treatment, and recovery services; and research, data, and metrics needs.

The Health Professional Education and Training working group is focused on creating a coordinated, interprofessional, patient- and family-centered framework for the continuum of health professional education that addresses acute and chronic pain management and substance use disorders. Recognizing that education and training gaps are a key contributor to the current crisis, the working group is first conducting a comprehensive literature review to identify the practice gaps that persist, and surveying accrediting, licensing, and certifying bodies to determine what educational requirements are currently in place across the health professions and across the education continuum. No such effort has been conducted to date, and the results will be used to inform the creation of an interprofessional framework to help align educational requirements and programming for pain management and substance use disorders across the education continuum.

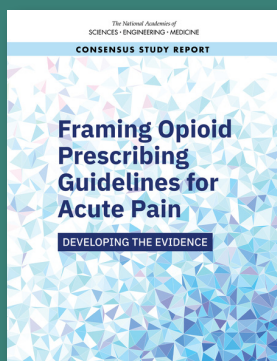
The Pain Management Guidelines and Evidence Standards working group is focused on highlighting and advancing opportunities to strengthen critical aspects of pain management, including patient-centered and evidence-based tapering guidance, multidisciplinary pain management approaches,

and judiciously implementing pain guidelines into practice. This working group is developing an expert-authored discussion paper on tapering opioids for chronic, non-cancer pain that will build on a public webinar of experts held in July 2019. The discussion paper will summarize the state of the evidence with respect to opioid tapering, highlighting existing best practices, as well as priority areas for further research. The group is also conducting a series of listening sessions to better understand the state of chronic pain management, featuring the perspectives of patients and the clinicians who care for them. Data gathered from these sessions will inform a person-centered visual journey map that is anticipated to highlight existing practice and system-level gaps in chronic pain management and key opportunities to address these gaps.

The Prevention, Treatment, and Recovery Services working group is focused on curating and disseminating best practices and integrated approaches to prevention, treatment, and recovery services for opioid use disorder, with guidance for how to implement, scale, and sustain them. To this end, the group is producing a comprehensive series of whitepapers and commentaries addressing a range of critical issues across prevention, treatment, and recovery services—all with the aim of advancing a continuum of care for opioid use disorder.

The Research, Data, and Metrics Needs working group includes representatives from the three other working groups, and is creating a comprehensive research agenda that will collate and prioritize the evidence gaps, research questions, and data and metrics needs identified throughout the Action Collaborative's work.

To read more about the Action Collaborative's work, visit [NAM.edu/OpioidCollaborative](https://nam.edu/OpioidCollaborative).



## Framing Opioid Prescribing Guidelines for Acute Pain: Developing the Evidence

The opioid overdose epidemic combined with the need to reduce the burden of acute pain poses a public health challenge. To address how evidence-based clinical practice guidelines for prescribing opioids for acute pain might help meet this challenge, this National Academies report presents a framework to evaluate existing clinical practice guidelines for prescribing opioids for acute pain indications, recommends indications for which new evidence-based guidelines should be developed, and recommends a future research agenda.



# Promoting Clinician Well-Being & Resilience

**Clinician well-being is essential for safe, high-quality patient care. However, burnout is a problem among all clinical disciplines and across diverse care settings.**

Studies estimate that between 35 percent and 54 percent of U.S. nurses and physicians have substantial symptoms of burnout, and the range for medical students and residents is between 45 percent and 60 percent. Clinician burnout is a workplace syndrome resulting from a chronic imbalance of high job demands and inadequate job resources.

As the drivers of burnout stem from the work environment, health care should apply a framework that views and addresses burnout as a systems issue, rather than as a personal mental health diagnosis. While individually targeted interventions may help individual clinicians and learners, they will not address the systemic issues that drive the burnout problem in the first place.

Health system leaders, accreditors, regulators, legislators, policymakers, insurers, health IT vendors, researchers, educators, clinicians, trainees, and patients must all work together to reduce

clinician burnout and foster professional well-being to ultimately help health systems improve patients', families', and clinicians' experiences and outcomes.

As a commitment to reversing trends in burnout, the NAM launched the Action Collaborative on Clinician Well-Being and Resilience (Clinician Well-Being Collaborative) in January 2017. The Clinician Well-Being Collaborative has had the following accomplishments under four primary goals.

## **1. Raise the visibility of clinician anxiety, burnout, depression, stress, and suicide**

- Marshaling a network of more than 210 organizations publicly committed to reversing trends in clinician burnout and improving clinician well-being
- Raising awareness about the challenges to clinician well-being via multiple publications and stakeholder events
- Collecting insights on well-being directly from



clinicians and their loved ones, as well as patients, via an art show

## 2. Improve baseline understanding of challenges to clinician well-being

- Developing a comprehensive conceptual model to characterize the factors that influence clinician well-being
- Creating and generating engagement around an award-winning online Clinician Well-Being Knowledge Hub that shares resources
- Compiling validated instruments to assess the work-related dimensions of well-being

## 3. Advance evidence-based, multidisciplinary solutions to improve patient care by caring for the caregiver

- Engaging the Centers for Medicare and Medicaid Services (CMS) to better align Evaluation and Management coding and documentation guidelines with the current practice of medicine
- Engaging electronic health record (EHR) vendors to make modifications to reduce burden and improve clinician well-being

## 4. Lay the foundation for long-term culture change

- Influencing national trends, such as Chief Wellness Officers, integration of clinician well-being into the culture of health professions education, and measurement of well-being

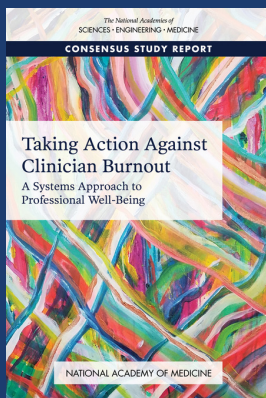
and burnout

- Providing actionable guidance for organizations to implement well-being initiatives through case studies

In July 2019, the Action Collaborative released clinician well-being case studies of The Ohio State University and the Virginia Mason Kirkland Medical Center to highlight organizational initiatives that have demonstrated success in supporting well-being and reducing burnout among practicing clinicians, trainees, and students. The case studies are intended to inform and inspire organizations facing similar challenges and seeking similar outcomes. Although there is no one-size-fits-all solution for improving clinician well-being, techniques and resources described in the case studies may provide a useful starting point for others. To learn more, visit [NAM.edu/CaseStudies](https://nam.edu/casestudies).

Over the next year, the Action Collaborative will focus on engaging leadership; reducing barriers to address mental health needs; establishing organizational standards, best practices, and metrics to improve clinician well-being; reforming documentation and the digital health environment; planning for the sustainability of clinician well-being efforts once current funding ends; and furthering the recommendations from the consensus report *Taking Action Against Clinician Burnout: A Systems Approach to Supporting Professional Well-Being*.

To access resources from the Action Collaborative, please visit [NAM.edu/CW](https://nam.edu/CW).



In October 2019, the NAM released *Taking Action Against Clinician Burnout: A Systems Approach to Supporting Professional Well-Being*. The consensus report calls for the prioritization of major system-level improvements in clinical work and learning environments in all settings, and for all disciplines, to prevent and mitigate clinician burnout and foster professional well-being at the systems level for the overall health of clinicians, patients, and the nation.

To learn more, visit [NAM.edu/ClinicianWellBeingStudy](https://nam.edu/ClinicianWellBeingStudy)



# Human Germline Genome Editing

**Clinical applications of germline genome editing are now possible, and there is an urgent need to examine the potential of this new technology.**

Many scientific and medical questions about the procedures remain to be answered, and determining the safety and efficacy of germline genome editing will be necessary but not sufficient conditions for possible future clinical usage. There is a need for a framework to inform the development of a potential pathway from research to clinical use, recognizing that components of this framework may need to be periodically revised in response to our rapidly evolving knowledge. In addition, other important discussions are ongoing internationally about the implications for society of human germline genome editing and include issues such as access, equity, and consistency with religious views.

The International Commission on the Clinical Use of Human Germline Genome Editing was convened with the participation of National Academies of Sciences and Medicine throughout the world to develop a framework for considering

technical, scientific, medical, regulatory, and ethical requirements for germline genome editing, should society conclude such applications are acceptable. The NAM, the National Academy of Sciences, and the UK Royal Society serve as the commission's secretariat. Overseeing the commission will be an international oversight board, comprised of leaders from public and private sectors including representative leadership of academies of sciences and medicine.

The commission has held three meetings and an international workshop. After the first meeting a call for public input was issued. The results of this call informed the second meeting and the international workshop. The third meeting was used to develop the commission's findings and recommendations. A final report providing the commission's findings and recommendations is expected in summer 2020.



# Climate Change & Human Health

## Climate change represents one of the most significant threats to human health in the 21st century.

The NAM will lead a multiyear, multi-million-dollar strategic initiative to accelerate evidence-informed activities at the intersection of health and climate, and to catalyze multi-sectoral action and commitment to advancing the most promising solutions. An international, multi-sectoral, expert planning committee has been appointed to guide the initiative's vision, goals, and programmatic activities. The initiative will be launched in fall 2020 in collaboration with units and divisions from across the National Academies.

In December 2019, laying the groundwork for this new initiative, the National Academies hosted an expert meeting to present the latest science and new opportunities for research and investment at the intersection of climate change and human health. Co-funded by the Burroughs Wellcome Fund (BWF) and the NAM, the meeting was designed to inform programmatic directions for the National Academies. Following the meeting, the NAM partnered with the BWF to provide funding for "opportunity grants" to interdisciplinary teams across the National Academies to explore

promising ideas at the intersection of climate change and human health. Funded projects will explore topics including but not limited to:

- Safe drinking water
- Mental health impacts for vulnerable populations and those who experience wildfires
- Children's health and development
- Extreme weather events
- Nutrition and food safety
- Reducing the carbon footprint of the health care sector

Visit [NAM.edu/ClimateChange](https://nam.edu/ClimateChange) to learn more.





# Advancing Health Equity

**“Health equity” means that everyone has a fair shot at living the healthiest life possible.**

The NAM’s Culture of Health Program (CoHP) is a multi-year collaborative effort to identify strategies to create and sustain conditions that support equitable good health for everyone in America. With the oversight of an expert advisory committee, the CoHP is working toward four primary goals.

**Lead:** Build a knowledge base to inform actions and partnerships that will advance health equity

**Engage:** Strengthen capacity in communities and inform legal, policy, and system reform

**Sustain:** Transform culture to accelerate progress in areas that still have significant health disparities

**Translate:** Bridge science to action for impact on health equity and optimal health for all

In 2017, the CoHP published its first consensus report, *Communities in Action: Pathways to Health Equity*. The report highlighted that health equity is crucial and health inequity is costly in terms of both financial and human capital

resources. It identified structural inequities and unequal allocation of power and resources as the root causes of health inequity. The report also emphasized the power of communities to address the social determinants of health. To learn more, visit [nationalacademies.org/HealthEquityHub](https://nationalacademies.org/HealthEquityHub).

In 2019, the CoHP released three additional consensus reports:

- *Vibrant and Healthy Kids: Aligning Science, Practice, and Policy to Advance Health Equity*. The preconception, prenatal, and early childhood periods are critical phases of development that help set the odds for lifelong health and well-being. This report outlines steps needed to move children who are at risk for negative outcomes toward positive health trajectories and reduce health disparities. To learn more, visit [nationalacademies.org/VibrantHealthyKids](https://nationalacademies.org/VibrantHealthyKids).
- *The Promise of Adolescence: Realizing Opportunity for All Youth*. There is ample evidence that the changes in brain structure and connectivity that happen

in adolescence present young people with unique opportunities for positive, life-shaping development, and for recovery from past adversity. This report provides recommendations for policy and practice that capitalize on these developmental opportunities and that address inequities that undermine the well-being of many adolescents and leave them less able to take advantage of the promise offered by this stage of life. To learn more, visit [nationalacademies.org/AdolescentDevelopment](https://nationalacademies.org/AdolescentDevelopment).

- *Integrating Social Care into the Delivery of Health Care: Moving Upstream to Improve the Nation's Health*. Health care systems are paying increased attention to the upstream social conditions that shape people's health because they affect both the delivery and the outcomes of health care. This report identifies and assesses current and emerging approaches and recommends ways to expand and optimize social care in the health care setting to achieve better and more equitable health outcomes. To learn more, visit [nationalacademies.org/SocialCare](https://nationalacademies.org/SocialCare).

Other notable accomplishments of the CoHP since its launch include:

- **Stakeholder convenings.** The program has hosted five public meetings and two webinars to further the scientific evidence base, encourage cross-sector dialogues, and explore ways to advance a culture of health. Meeting topics ranged from building a movement to effectively communicating about health equity and the social determinants of health. Each convening activity placed equity principles at the center and offered an opportunity to engage diverse perspectives and elevate the stories of those with lived experience.

- **Community-Driven Health Equity Action Plans.** The program has done ongoing work with five exemplary communities across the United States to develop actionable plans to advance health equity at the community level. Each team worked with their communities and learned from field experts and researchers to develop implementation plans based on community-identified priorities.

- **Communities Driving Health Equity.** A short documentary series shares lessons from three community organizations working to advance health equity at the local level.

- **Visualize Health Equity (VHE) and Young Leaders Visualize Health Equity (YLVHE).**

The program's nationwide art shows inspire communities around the country to partake in similar art-inspired events and to host the related traveling exhibition at conferences, events, and organizations. Launched in August 2017, VHE called on artists of all kinds to illustrate what health equity looks, sounds, and feels like to them. Thirty pieces were selected for an in-person visiting gallery at the National Academies, and 125 are featured in an online gallery. Building on the success of VHE, the NAM launched Young Leaders Visualize Health Equity in November 2019 after calling on people between the ages of 5 and 26 to imagine a world where everyone has the same chance to live a healthy life. Young leaders illustrated how the social determinants of health shape their lives and the lives of those closest to them. To accompany the over 175 pieces of art, the CoHP also developed resources to help others put art in action and include the voices of young people in ongoing dialogues about health equity.

To learn more, visit [NAM.edu/CultureofHealth](https://nam.edu/CultureofHealth).



# Artificial Intelligence in Health Care

**Artificial intelligence is poised to make transformative advances in health care, but must be balanced by reducing potential unintended consequences.**

The emergence of artificial intelligence as a tool for better health care offers unprecedented opportunities to improve patient and clinical team outcomes, reduce costs, and impact population health. Despite this promise, it is imperative to proceed with caution, or the health care system risks user disillusionment or further exacerbation of existing health and technology-driven disparities.

This Special Publication synthesizes current knowledge to offer a reference document for relevant health care stakeholders; outlines the current and near-term AI solutions; highlights the challenges, limitations, and best practices for AI development, adoption, and maintenance; offers an overview of the legal and regulatory landscape for AI tools; prioritizes the need for equity, inclusion, and a human rights lens; and outlines key considerations for moving forward.

The Special Publication notes that population-representative data accessibility, standardization, and quality is vital to the future of AI, as this data is necessary to achieve performance levels necessary

for scalable success. Ethical health care, equity, and inclusivity must be prioritized, as there are already high-profile examples of biased AI tools that have damaged the public's trust in these systems. The authors of the Special Publication believe that the near-term focus should be on augmented intelligence rather than full automation, as the public's tolerance for machine error is extremely low, and human override of AI systems is important for building back this user trust. Finally, that existing frameworks and best practices within the learning health system, human factors research, and implementation science should be leveraged to support AI development and roll out.

AI tools could potentially address known challenges in health care delivery and achieve the vision of the continuously learning health system, but should be rolled out thoughtfully and in collaboration with a wide variety of stakeholders. Read the Special Publication at [nam.edu/AIPub](https://nam.edu/AIPub).





# Understanding Heterogeneous Treatment Effects

**Better population-based outcomes will only be realized when we understand more completely how to treat patients as the unique individuals that they are.**

Despite broad acceptance of evidence-based medicine, a fundamental issue remains unsolved: evidence is derived from groups of people but medical decisions are made for and by individuals. Clinicians have persistently asserted that determining the best therapy for each individual patient is a more complicated endeavor than just picking the best treatment on average. However, traditional approaches continue to rely on the average effects estimated from the outcomes of clinical trials.

This Special Publication is based on a workshop held on May 31, 2018 that considered patient and stakeholder perspectives on the importance of understanding heterogeneous treatment effects and best practices for implementing clinical programs that take heterogeneous treatment effects into account. For evidence to be most applicable to individual patients, we need to combine methods for strong causal inference with

methods for prediction that permit inferences about which particular patients are likely to benefit and which are not. Reaching this potential will require deep collaboration between researchers, clinicians, patients, and their families. Not only will patient cooperation be critical in the design and performance of clinical trials that aim to understand these effects, the patients themselves will be partners with clinicians in making treatment decisions about their care.

By understanding the reasons for treatment effect heterogeneity and developing ways to predict how patients will respond to a treatment, medical researchers and clinicians should be able to personalize medicine to a far greater degree than is possible today—treating each patient as the individual that they are.

Read the Special Publication at [nam.edu/IndividualPatient](https://nam.edu/IndividualPatient).

# Vital Directions for Health & Health Care

**What can be more vital to each of us than our health? Practical and accessible steps can be taken at the federal, state, and local levels to address the issues that matter most to improving health.**

In its Vital Directions for Health and Health Care initiative, the NAM marshaled the wisdom of more than 150 of the nation's top researchers and health policy experts to assess opportunities for substantially improving the health and well-being of Americans, the quality of care delivered, and the contributions of science and technology.

In 2019, the NAM turned to the state level, beginning with a symposium in North Carolina. While national policies can have great influence on care delivery and outcomes, progress also depends on, and can be further propelled by, actions at the state and local level. The NAM chose North Carolina as it is at the forefront of health care transformation, and illustrates the promise of, and the challenges facing, U.S. health and health care. North Carolina has some of the premier health systems and health care innovators capable of delivering state-of-the-art care as well as health

care providers and community organizations developing and implementing new population health innovations.

This symposium brought together various stakeholders to better understand actions that are being taken at the state-level to achieve, and barriers in the pursuit of, more affordable, value-driven, quality care and health outcomes. While the focus was primarily on state-based innovations and challenges, the initiative also included national-level perspectives and insights. The symposium was a ripe opportunity to examine state-based capacity and lessons-learned for guiding health policy, as well as synergies among institutions and organizations that could lead to a more equitable health future for all. In May 2020, the *North Carolina Medical Journal* published a special issue on the Vital Directions North Carolina experience.

To learn more, visit [NAM.edu/VitalDirections](https://nam.edu/VitalDirections).



# The Future of Nursing 2020–2030

**The 2010 consensus report *The Future of Nursing: Leading Change, Advancing Health* transformed the field by endorsing expanded scope of practice for nurses. In 2021, the NAM will publish the next volume in this groundbreaking series.**

An expert committee will extend the vision for the nursing profession into 2030 and chart a path for the nursing profession to help our nation create a culture of health, reduce health disparities, and improve the health and well-being of the U.S. population in the 21st century. The committee will examine the lessons learned from the Future of Nursing Campaign for Action as well as the current state of science and technology to inform their assessment of the capacity of the profession to meet the anticipated health and social care demands from 2020 to 2030. In developing its recommendations for the future decade of nursing

in the United States, the Committee on the Future of Nursing 2020-2030 will draw from domestic and global examples of evidence-based models of care that address social determinants of health and help build and sustain a culture of health.

The committee hosted a public meeting in March 2019, information-gathering town halls over the summer, and a technical panel in November 2019. The final report is expected in spring 2021.

Visit [NAM.edu/FutureofNursing2030](https://nam.edu/futureofnursing2030) for more information.



A photograph of a family walking on a beach at sunset. The sun is low on the horizon, creating a warm, golden glow. In the foreground, an older woman with short dark hair, wearing a patterned shirt and dark pants, is walking towards the right. In the background, a man and a woman are walking away from the camera, holding hands with a small child between them. The beach is sandy, and the ocean is visible in the distance.

# Healthy Longevity Global Grand Challenge

**Dramatic breakthroughs in medicine, public health, and social and economic development have resulted in unprecedented extensions of the human lifespan across the world over the past century.**

The Healthy Longevity Global Grand Challenge is a worldwide movement to improve physical, mental, and social well-being for people as they age. The initiative aims to 1) comprehensively address the challenges and opportunities presented by global population aging; 2) catalyze breakthrough ideas and research that will extend the human healthspan; 3) generate transformative and scalable innovations worldwide; 4) and build a broad ecosystem of support by enabling scientists, engineers, innovators, entrepreneurs, health leaders, policy makers, and the public to work together to achieve the promise of healthy longevity.

The Grand Challenge has two parts. The Global Roadmap for Healthy Longevity will assemble an independent International Commission to author an evidence-based report with recommendations for societies worldwide to foster healthy longevity by through strategies related to the social and behavioral enablers of health, health care and public

health systems, and science and technology. The Commission's work will be informed by three public workshops in the United States, Singapore, and Japan. The Commission's final report is expected in mid-2021.

The Healthy Longevity Global Competition is a multiyear, multi-million-dollar international competition that will accelerate breakthroughs in healthy longevity through a series of monetary awards and prizes. The competition is open to innovators of any background, including science, medicine, public health, technology, entrepreneurship, public policy, social engineering, and beyond. At its annual meeting in October 2019, the NAM launched the competition simultaneously with eight global collaborator organizations, including Academia Sinica of Taiwan; Chinese Academy of Medical Sciences; EIT Health; Japan Agency for Medical Research and Development; Ministry of Health and National Research Foundation of Singapore; UK Research and Innovation; and the National Institute on Aging,

U.S. National Institutes of Health. The NAM and its global collaborators have mobilized more than \$30 million in funding so far. Innovators from nearly 50 countries and territories will have the opportunity to compete for the awards.

The competition consists of three phases internationally. Catalyst Phase: Over 3 rounds, approximately 450 awards worth \$50,000 USD each will be issued globally as seed funding to advance new, innovative ideas. The first cycle of the Catalyst Phase opened in January 2020 and winners will be announced in fall 2020. Awardees will be invited to attend an annual Innovator Summit—the first of which is set for summer 2021—to share their work with policymakers, researchers, potential investors, and fellow innovators from around the world. Accelerator Phase: Awards worth \$500,000

to \$1 million USD or more will be issued to meritorious Catalyst awardees who have demonstrated significant progress, in order to support the further advancement of their bold ideas (starting in 2021). Grand Prize: One or more grand prize(s) of up to \$5 million USD will be awarded for achievement of a breakthrough innovation that extends the human healthspan (starting in 2023).

Learn more at [NAM. edu/HealthyLongevity](https://nam.edu/HealthyLongevity).







# Committee on Emerging Science, Technology, & Innovation

**The benefits of scientific advancements could be enormous, but so could the risks. To prepare the profession, policy makers, and society for the future, the NAM has established a committee to evaluate the complex impacts of breakthroughs.**

Advances in biomedical science, data science, engineering, and technology are leading to high-pace innovation with tremendous potential to transform health and medicine. At the same time, these innovations carry risks that have important implications for society related to access, cost, equity, social norms and ethics, and more. There is a need for society to understand the implications of such advances and to be prepared for them. The National Academy of Medicine's 5-year strategic plan includes an important goal to provide leadership and engage broad communities in developing a framework to proactively address these impending challenges.

The NAM Committee on Emerging Science, Technology, and Innovation in Health and Medicine

(CESTI) will consider not only the positive but also the potentially negative implications of these developments. The committee is charged with: 1) identifying emerging developments in biological and medical research and technology; 2) identifying attendant social, ethical, regulatory, and workforce ramifications; 3) identifying opportunities for the independent examination of such questions; and 4) developing a national/international framework to proactively and collectively address the impact of developments, both positive and negative.

The Committee includes leaders from an interdisciplinary assortment of fields and is co-chaired by Atul Butte, George Daley, and Alondra Nelson.

For more information, please visit [NAM.edu/CESTI](https://nam.edu/CESTI).





## Member Highlights

The NAM has more than 2,200 members elected in recognition of professional achievement and commitment to volunteer service in activities of the National Academies of Sciences, Engineering, and Medicine. In 2019, the NAM elected 90 regular members and 10 international members. For those at the top of their field, NAM membership reflects the height of professional achievement and commitment to service.

# Inaugural Election of NAM Officers

In 2019, the membership of the National Academy of Medicine elected its president, home secretary, and foreign secretary for the first time. Election of officers is a central tenet of the NAM's governing structure following the 2015 reconstitution of the Institute of Medicine (IOM) as an Academy alongside the National Academy of Sciences and the National Academy of Engineering.



**Victor J. Dzau, MD**, was elected to a second, 6-year term as NAM President beginning in July 2020. Following a national search, Dzau was originally appointed as president of the IOM in 2014. During his first term, Dzau guided the organization through a complex transformation that entailed the establishment of novel operational and programmatic infrastructure for the NAM. He oversaw the development of a 5-year strategic plan and championed the development of innovative program models within the NAM and the National Academies—including the international commission and action collaborative models. He also launched major initiatives to increase member engagement, advance diversity and inclusion, and build the leadership pipeline.



**Jane Henney, MD**, was elected to a second, 4-year term as NAM Home Secretary. In this role, she oversees the conduct of all membership affairs, including elections; promotes engagement of members in NAM and National Academies activities; and provides guidance and consultation for the staff of the NAM Office of Membership and Governance, among other responsibilities. Subsequent to her election, Dr. Henney decided to step down from the role of Home Secretary as of June 30, 2020. **Elena Fuentes-Afflick, MD, MPH**, was appointed by the NAM Council to serve the remainder of the term.



**Carlos del Rio, MD**, was elected to a 4-year term beginning July 1, 2020, as NAM Foreign Secretary, succeeding Margaret Hamburg, who assumed the role in 2015. In this role, he has responsibility for planning and conduct of the international affairs of the Academy, including liaising with international organizations; consulting with the U.S. government on matters of international health; and promoting the nomination and engagement of international NAM members, among other duties.





## Members Inducted in 2019 (Class of 2018)

**Hanan Mohamed S. Al-Kuwari, PhD**

State of Qatar and Hamad Medical Corp.

**Bruce Aylward, MD**

World Health Organization

**Francoise Barre-Sinoussi, PhD**

Institut Pasteur

**Linamara Rizzo Battistella, MD, PhD**

São Paulo State Secretariat for the Rights of Persons with Disabilities and University of São Paulo

**Yasmine Belkaid, PhD**

National Institute of Allergy and Infectious Diseases, National Institutes of Health

**James M. Berger, PhD**

Johns Hopkins University

**Richard E. Besser, MD**

Robert Wood Johnson Foundation

**Richard S. Blumberg, MD**

Harvard Medical School and Brigham and Women's Hospital

**Azad Bonni, MD, PhD**

Washington University School of Medicine

**Zulfiqar A. Bhutta, MB, BS, PhD, FCPS, FRCP, FRCPCH, FAAP**

The Hospital for Sick Children and The Aga Khan University

**Andrea Califano, Dr**

Columbia University

**Michael A. Caligiuri, MD**

City of Hope National Medical Center

**Clifton Watson Callaway, MD, PhD**

University of Pittsburgh

**Elias Campo, MD, PhD**

University of Barcelona and Institute of Biomedical Research August Pi i Sunyer

**Yang Chai, DMD, PhD, DDS**

University of Southern California

**Giselle Corbie-Smith, MD, MSc**

University of North Carolina

**Peter Daszak, PhD**

EcoHealth Alliance

**Michael S. Diamond, MD, PhD**

Washington University School of Medicine

**Susan M. Domchek, MD**

University of Pennsylvania

**Francesca Dominici, PhD**

Harvard T.H. Chan School of Public Health and Harvard Data Science Initiative



**Benjamin Levine Ebert, MD, PhD**

Harvard Medical School

**Jennifer Hartt Elisseeff, PhD**

Johns Hopkins University

**Robert L. Ferrer, MD, MPH**

University of Texas Health Science Center

**Robert M. Friedlander, MD, MA**

University of Pittsburgh Medical Center

**Ying-Hui Fu, PhD**

University of California, San Francisco

**William A. Gahl, MD, PhD**

National Human Genome Research Institute, National Institutes of Health

**Joshua A. Gordon, MD, PhD**

National Institute of Mental Health, National Institutes of Health

**Scott Gottlieb, MD**

U.S. Food and Drug Administration

**David Allen Hafler, MD, MSc**

Yale School of Medicine

**Evelynn Maxine Hammonds, PhD**

Harvard University

**David Newcomb Herndon, MD, FACS**

University of Texas Medical Branch and Shriners Hospitals for Children

**Steven M. Holland, MD**

National Institute of Allergy and Infectious Diseases, National Institutes of Health

**Amy Houtrow, MD, PhD, MPH**

University of Pittsburgh

**Jeffrey Alan Hubbell, PhD**

University of Chicago

**John P. A. Ioannidis, MD, DSc**

Stanford University

**Robert E. Kingston, PhD**

Massachusetts General Hospital and Harvard Medical School

**Ophir David Klein, MD, PhD**

University of California, San Francisco

**Alexander H. Krist, MD, MPH, FAAFP**

Virginia Commonwealth University

**John Kuriyan, PhD**

University of California, Berkeley

**Joy Elizabeth Lawn, MBBS, MPH, FRCP (Paeds), PhD, FMedSci**

London School of Hygiene and Tropical Medicine

**Ellen Leibenluft, MD**

National Institute of Mental Health, National Institutes of Health

**Gabriel Matthew Leung, MD**

University of Hong Kong

**Linda M. Liau, MD, PhD, MBA**

University of California, Los Angeles

**Keith Douglas Lillemoe, MD**

Massachusetts General Hospital and Harvard Medical School

**Xihong Lin, PhD**

Harvard T.H. Chan School of Public Health

**Catherine Reinis Lucey, MD**

University of California, San Francisco

**Ellen J. MacKenzie, PhD, MSc**

Johns Hopkins Bloomberg School of Public Health

**Martin A. Makary, MD, MPH, FACS**

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**Bradley A. Malin, PhD, FACMI**

Vanderbilt University

**George Mashour, MD, PhD**

University of Michigan

**Ann Carolyn McKee, MD**

Boston University School of Medicine and VA Boston Healthcare System

**Barbara J. Meyer, PhD**

Howard Hughes Medical Institute and University of California, Berkeley

**Matthew Langer Meyerson, MD, PhD**

Harvard Medical School and DanaFarber Cancer Institute

**Terrie E. Moffitt, PhD**

Duke University

**Sean J. Morrison, PhD**

University of Texas Southwestern Medical Center

**Charles Alexander Nelson III, PhD**

Boston Children's Hospital and Harvard University

**Kunle Odunsi, MD, PhD, FRCOG, FACOG**

Roswell Park Comprehensive Cancer Center

**Lucila Ohno-Machado, MD, PhD**

University of California, San Diego

**Jordan Scott Orange, MD, PhD**

Columbia University and New York Presbyterian/Morgan Stanley Children's Hospital

**Beverley Anne Orser, MD, PhD, FRCPC**

University of Toronto and Sunnybrook Health Science Centre

**Lori J. Pierce, MD**

University of Michigan

**Daniel E. Polsky, PhD**

University of Pennsylvania

**Carol Propper, PhD**

Imperial College Business School

## MEMBER HIGHLIGHTS

**Josiah “Jody” Rich, MD, MPH**  
Brown University and The Miriam Hospital

**Gene Ezia Robinson, PhD**  
University of Illinois at Urbana Champaign

**Hector P. Rodriguez, PhD**  
University of California, Berkeley

**Charles N. Rotimi, PhD**  
National Human Genome Research Institute, National Institutes of Health

**Ralph Lewis Sacco, MD, MS, FAAN, FAHA**  
University of Miami

**Judith A. Salerno, MD, MS**  
New York Academy of Medicine

**Nanette Frances Santoro, MD**  
University of Colorado

**Stuart L. Schreiber, PhD**  
Harvard University

**Arlene Sharpe, PhD, MD**  
Harvard Medical School

**Marie Celeste Simon, PhD**  
University of Pennsylvania

**Albert L. Siu, MD, MSPH**  
Icahn School of Medicine at Mount Sinai

**Claire Sterk, PhD**  
Emory University

**Susan Stone, DNSc, CNM, FACNM, FAAN**  
Frontier Nursing University and American College of Nurse-Midwives

**Sylvia Trent-Adams, PhD, RN, FAAN**  
Office of the Surgeon General, U.S. Department of Health and Human Services

**Kara Odom Walker, MD, MPH, MSHS**  
Delaware Department of Health and Human Services

**Peter Walter, PhD**  
Howard Hughes Medical Institute and University of California, San Francisco

**Xiaobin Wang, MD, MPH, ScD**  
Johns Hopkins University and Children’s Center

**Ronald John Weigel, MD, PhD**  
University of Iowa

**Rachel M. Werner, MD, PhD**  
University of Pennsylvania

**Janey L. Wiggs, MD, PhD**  
Harvard Medical School; Massachusetts Eye and Ear; and Broad Institute of MIT and Harvard

**Teresa Woodruff, PhD**  
Northwestern University

**King-Wai Yau, PhD**  
Johns Hopkins University School of Medicine

## Members Elected in 2019 (Class of 2019)

**Edwin (Ted) G. Abel, PhD**  
University of Iowa

**Denise R. Aberle, MD**  
University of California, Los Angeles

**Charles S. Abrams, MD**  
University of Pennsylvania

**Anthony P. Adamis, MD**  
Genentech/Roche and Harvard Medical School

**Adaora Alise Adimora, MD, MPH**  
University of North Carolina, Chapel Hill

**Julia Adler-Milstein, PhD**  
University of California, San Francisco

**Nita Ahuja, MD, MBA**  
Yale School of Medicine

**Ama de-Graft Aikins, PhD**  
University College London

**C. David Allis, PhD**  
The Rockefeller University

**David G. Amaral, PhD**  
University of California, Davis

**Vineet Arora, MD, MAPP**  
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**Carol J. Baker, MD**  
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**Colleen L. Barry, PhD, MPP**  
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**Elaine E. Batchlor, MD, MPH**  
Martin Luther King Jr. Community Hospital

**Peter S. Bearman**  
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**L. Ebony Boulware, MD, MPH**

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**Charles C. Branas, PhD**

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**Marina Cavazzana, MD, PhD**

Paris University Medical School; Hôpital Necker-Enfants malades, Assistance Publique-Hôpitaux de Paris; and Imagine Institute

**David Cella, PhD**

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**Deborah J. Cohen, PhD**

Oregon Health & Science University

**Dorin Comaniciu, PhD**

Siemens Healthineers

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**Rebecca Miriam**

**Cunningham, MD**

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Stanford University

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University of Michigan

**Beverly L. Davidson, PhD**

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University of Pennsylvania

**Raymond N. DuBois Jr., MD, PhD**

The Medical University of South Carolina

**James H. Eberwine, PhD**

University of Pennsylvania

**Elizabeth C. Engle, MD**

Howard Hughes Medical Institute; Harvard Medical School; Boston Children's Hospital; and Broad Institute of MIT and Harvard

**Deborah Estrin, PhD**

Cornell University and Cornell Tech

**Bartholomeus C.J.M. Fauser, MD, PhD, FRCOG**

University of Utrecht

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Imperial College London

**Betty R. Ferrell, PhD, FAAN**

City of Hope

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Baylor College of Medicine

**Laura M. Gottlieb, MD, MPH**

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**Stephan A. Grupp, MD, PhD**

University of Pennsylvania and Children's Hospital of Philadelphia

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Grady Memorial Hospital; Emory University School of Medicine; and CNN

**J. Silvio Gutkind, PhD**

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Wills Eye Hospital and Thomas Jefferson University

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University of Washington and Fred Hutchinson Cancer Research Center

**Diane Havlir, MD**

University of California, San Francisco

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National Center for Injury Control and Prevention, Centers for Disease Control and Prevention

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Yale School of Medicine

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Johns Hopkins University

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The University of Texas at Austin

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Weill Cornell Medicine and New York-Presbyterian/Weill Cornell Medical Center

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The Ohio State University

**Adrian R. Krainer, PhD**

Cold Spring Harbor Laboratory

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Microsoft Corp.

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**Anil K. Rustgi, MD**

Columbia University

**David G. Schatz, PhD**

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**Dorry L. Segev, MD, PhD**

Johns Hopkins University

**Julie A. Segre, PhD**

National Human Genome  
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**Nenad Sestan, MD, PhD**

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**Peter L. Slavin, MD**

Massachusetts General Hospital

**Benjamin D. Sommers, MD,  
PhD**

Harvard T.H. Chan School of  
Public Health and Brigham &  
Women's Hospital

**Beth Stevens, PhD**

Boston Children's Hospital and  
Harvard Medical School; Howard  
Hughes Medical Institute; and  
Broad Institute of MIT and  
Harvard

**Jacquelyn Taylor, PhD, PNP-  
BC, RN, FAHA, FAAN**

NYU Rory Meyers College of  
Nursing

**Mehmet Toner, PhD**

Massachusetts General Hospital  
and Harvard Medical School

**Peter A. Ubel, MD**

Duke University

**Sir Nicholas Wald, FRS, FRCP,  
FMedSci, D.Sc. (Med)**

University College London; St.  
Georges University of London;  
and Brown University, London

**John Eu-Li Wong, MBBS**

National University of Singapore  
and National University Health  
System, Singapore

**Catherine S. Woolley, PhD**

Northwestern University

**Catherine J. Wu, MD**

Harvard Medical School and  
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**Joseph C. Wu, MD**

Stanford University School of  
Medicine

**Kristine Yaffe, MD**

University of California, San  
Francisco

**Rachel Yehuda, PhD**

Icahn School of Medicine at  
Mount Sinai

**Richard Allen Young, PhD**

Massachusetts Institute of  
Technology

# 2019 Nobel Laureates



## **William Kaelin Jr. and Gregg L. Semenza**

### *Nobel Prize in Physiology or Medicine*

Kaelin and Semenza both received one-third of the 2019 Nobel Prize in Physiology or Medicine “for their discoveries of how cells sense and adapt to oxygen availability.” Kaelin was elected to the NAM in 2007, and Semenza was elected in 2012. Both Kaelin and Semenza are also members of the National Academy of Sciences.

# 2019 Annual Meeting

## The Evolution of Technology in Biomedical Science: Promises and Challenges

The 49th NAM Annual Meeting took place October 19–21, 2019. The meeting featured a public scientific symposium titled “The Evolution of Technology in Biomedical Science: Promises and Challenges.”

**Keith Wailoo** of Princeton University delivered a keynote address on “Technology, Diversity and the Future of Health: The Social Predicament of Genetic Innovation” (*pictured below*). Three panels of distinguished scientists followed the keynote, on the topics: “Data Sharing and the Individual: The Tension between Privacy and Open Source Data in Science”; “Shaping Next Generation Delivery

Using Artificial Intelligence”; and “Human Genome Editing: Navigating Ethics and Global Governance.”

The meeting also included the 2019 President’s Forum, on the topic “Realizing the Potential of Science and Technology in Health & Medicine: Navigating the Implications for Society.” NAM president **Victor J. Dzau** led a dynamic discussion between panelists **Robert Cook-Deegan** from Arizona State University, **Scott Gottlieb** from the American Enterprise Institute, **Alondra Nelson** of the Social Science Research Council, and **Elias Zerhouni** of Johns Hopkins University.







The NAM is grateful to the 2019 scientific program planning committee:

- **Angela Diaz, MD, PhD, MPH** (*Chair*), Jean C. and James W. Crystal Professor, Department of Pediatrics and Department of Environmental Medicine and Public Health, Icahn School of Medicine at Mount Sinai and Director, Mount Sinai Adolescent Health Center
- **Jeffrey R. Balser, MD, PhD**, President and CEO, Vanderbilt University Medical Center and Dean, School of Medicine, Vanderbilt University
- **Jeffrey Kahn, PhD, MPH**, Andreas C. Dracopoulos Director, and Levi Professor of Bioethics and Public Policy, Berman Institute of Bioethics, Johns Hopkins University
- **Story C. Landis, PhD**, Scientist Emeritus, National Institute of Neurological Disorders and Stroke
- **Robert S. Langer, ScD**, David Koch Institute Professor, Massachusetts Institute of Technology
- **Suchi Saria, MSc, PhD**, John C. Malone Assistant Professor, Department of Computer Science, Johns Hopkins University
- **William W. Stead, MD**, Chief Strategy Officer, McKesson Foundation and Professor of Biomedical Informatics and Medicine, Vanderbilt University Medical Center
- **Keith R. Yamamoto, PhD**, Vice Chancellor for Science Policy and Strategy, University of California, San Francisco (UCSF); UCSF Precision Medicine; and Professor, Cellular and Molecular Pharmacology, UCSF

# In Memoriam

The National Academy of Medicine honors the life and work of members who passed away between January 1, 2019, and April 30, 2020.

Wayne C. Bardin  
Ben D. Barker  
Elizabeth Barrett-Connor  
Lionel M. Bernstein  
Robert L. Black  
Clara D. Bloomfield  
Sydney Brenner  
Charles C.J. Carpenter  
Johna A. Downey  
Ronald S. Duman  
Mitzi L. Duxbury  
Neil J. Elgee  
Martin S. Feldstein  
Maurice S. Fox  
Yuan-Cheng B. Fung  
Robert J. Genco  
Paul Greengard  
David A. Hamburg

Waun K. Hong  
Kurt J. Isselbacher  
Richard Janeway  
Thomas M. Jessell  
Wolfgang K. Joklik  
Donald Kennedy  
Anne K. Kibrick  
Sung Wan Kim  
Luella Klein  
Walter F. Leavell  
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LaSalle D. Leffall  
Donald A. Lindberg  
Floyd J. Malveaux  
Paul A. Marks  
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Ruth McCorkle  
Bruce S. McEwen

John Mendelsohn  
Fitzhugh Mullan  
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James G. Nuckolls  
John W. Owen  
Arthur B. Pardee  
Dominick P. Purpura  
John B. Robbins  
Peter Rosen  
Edward Rubenstein  
Judith S. Stern  
James E. Strain  
Walter J. Wadlington  
Bailus Walker  
James B. Wyngaarden  
Edward Zigler



## **Fellowships & Leadership Programs**

The National Academy of Medicine administers five national and international fellowship programs, as well as the Emerging Leaders in Health and Medicine Program. Together, the NAM's growing portfolio of fellowships and leadership programs is intended to position the next generation for leadership, innovation, and impact in health, medicine, and biomedical science.



# Fellowships

The NAM administers five fellowships designed to cultivate the next generation of leaders in health and medicine, and engage them in the work of the NAM and the National Academies. These include the Robert Wood Johnson Foundation (RWJF) Health Policy Fellows Program—which for nearly 50 years in operation is the Academy’s longest-standing program—as well as the FDA Tobacco Regulatory Science Fellowship, the Distinguished Nurse Scholar-in-Residence

program, and seven subject specific NAM Fellowships for Health Science Scholars.

In 2018, the NAM launched two new international fellowships: the International Health Policy Fellowship in partnership with the Chinese University of Hong Kong, and the Fellowship in Global Health Leadership in partnership with the Hong Kong University School of Public Health.

## 2019-2020 Robert Wood Johnson Foundation Health Policy Fellows

**Sharron Crowder, PhD, RN, ATSF**  
Indiana University

**Kristen Dillon, MD**  
PacificSource

**Charles Mathias, PhD**  
University of Texas Health Science Center in San Antonio

**Michelle Morse, MD, MPH**  
Harvard Medical School/  
Brigham and Women’s Hospital;  
Social Medicine Consortium

**Joseph Sakran, MD, MPH, MPA**  
Johns Hopkins University

**Liliane Windsor, PhD, MSW**

## NAM Fellowships for Health Science Scholars

*2019-2021 Norman F. Gant/American Board of Obstetrics and Gynecology Fellow*

**Saul D. Rivas, MD, MPH**  
University of Texas Rio Grande Valley School of Medicine

*2019-2021 James C. Puffer, M.D./American Board of Family Medicine Fellow*

**Lars Peterson, MD, PhD**  
American Board of Family Medicine;  
University of Kentucky

*2019-2021 Gilbert S. Omenn Fellow*

**Anaeze Offodile II, MD, MPH**  
MD Anderson Cancer Center

*2019-2021 American Board of Emergency Medicine Fellowship*

**Arjun Venkatesh MD, MBA, MHS**  
Yale University; Yale Center for Outcomes Research and Evaluation

*2019-2021 Greenwall Fellow*

**Rachel Fabi, PhD**  
SUNY Upstate Medical University

*2018-2020 Pharmacy Fellow*

**Dima M. Qato, PharmD, MPH, PhD**  
University of Illinois at Chicago, College of Pharmacy

*2018-2020 Osteopathic Medicine Fellow*

**Michelle Kvalsund, DO, MS**  
Michigan State University

## FELLOWSHIPS & LEADERSHIP PROGRAMS

### 2019-2020 Nurse Scholar-in-Residence

**Allison Squires, PhD, RN, FAAN**  
NYU Rory Meyers College of Nursing

### International Fellowships

*2018-2020 International Health Policy Fellow*

**Roger Chung, PhD, MHS**  
Chinese University of Hong Kong

*2019-2020 NAM-HKU Fellow in Global Health Leadership*

**Chinmoy Sarkar, BSc, Msc, PhD**  
University of Hong Kong

### 2019-2020 FDA Tobacco Regulatory Science Fellows

**Ravi Choudhuri, MPH**  
Public Health Professional

**Reema Goel, PhD, MS**  
Pennsylvania State University

**Marzena Spindle, PhD, MHS**  
Behavioral Pharmacologist

**Deeba Syed, PhD, MBBS**  
University of Wisconsin-Madison

*Pictured (left to right): Rivas, Fabi, Offodile, Venkatesh, Peterson, Squires*







## Emerging Leaders in Health and Medicine

The Emerging Leaders in Health and Medicine (ELHM) program facilitates opportunities for mentorship, collaboration, and innovation among emerging leaders, NAM members, and experts across sectors. Program scholars also provide valuable input and feedback to help shape the priorities of the NAM and sustain the NAM's impact and reputation as a national leader in advancing knowledge and accelerating progress in science, medicine, policy, and health equity.

On July 17-18, 2019, approximately 70 emerging leaders and 35 National Academy of Medicine (NAM) members gathered in Washington, DC, for the inaugural Emerging Leaders Forum. A planning committee made up of ELHM Scholars designed the 2019 Forum, with input from NAM

leadership, to provide opportunities to present and build upon their own work, identify novel and inventive strategies of tackling commonly shared personal and professional challenges, and network with NAM members and each other. The forum featured interactive panel sessions developed by the emerging leaders; lunches with NAM members; a fireside chat with Francis Collins, Director of the National Institutes of Health; and small group discussions about cross-cutting areas of interest.

A summary of the forum is available online at [NAM.edu/EmergingLeaders](https://nam.edu/EmergingLeaders).



## 2019–2020 Emerging Leaders in Health and Medicine Scholars

**Maria Elena Bottazzi, PhD**

Baylor College of Medicine

**Paul P. Christopher, MD**

Brown University

**Deidra C. Crews, MD, ScM**

Johns Hopkins University School of Medicine

**Adaeze Enekwechi, PhD, MPP**

Impaq, LLC

**Oluwadamilola “Lola” Fayanju, MD, MA, MPH**

Duke University

**Lori Freedman, PhD**

University of California, San Francisco

**Christopher Friese, PhD, RN, AOCN, FAAN**

University of Michigan

**Jordan Green, PhD**

Johns Hopkins University

**Marcia Haigis, PhD**

Harvard Medical School

**Leora Horwitz, MD**

New York University School of Medicine

**Mark Huffman, MD, MPH**

Northwestern University Feinberg School of Medicine; The George Institute for Global Health

**Ning (Jenny) Jiang, PhD**

University of Texas at Austin

**Sandeep Kishore, MD, PhD, MSc**

Mount Sinai Health

**Raina Merchant, MD, MSHP**

Penn Medicine/Digital Health; University of Pennsylvania

**Mark Neuman, MD**

University of Pennsylvania

**Minal Patel, PhD, MPH**

University of Michigan

**Brea Perry, PhD**

Indiana University

**Nathan Price, PhD**

Institute for Systems Biology

**Suchi Saria, PhD, MSc**

Johns Hopkins University

**Margaret (Gretchen) L. Schwarze, MD, MPP**

University of Wisconsin

**Julie Segre, PhD**

National Institutes of Health

**Jacob Sherkow, JD, MA**

New York Law School

**Hanni Stoklosa, MD, MPH**

Harvard Medical School

**Sohail Tavazoie, MD, PhD**

The Rockefeller University

**Hassan A. Tetteh, MD, MBA, MPA, MS**

United States Navy; Uniformed Services University of the Health Sciences

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New York Academy of Medicine

**Jonathan Watanabe, PharmD, MS, PhD, BCGP**

University of California, San Diego

**Jeffrey K. Wickliffe PhD, MS**

Tulane University

**Joseph C. Wu, MD, PhD**

Stanford School of Medicine

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Massachusetts General Hospital; Harvard Medical School



## Awards

The National Academy of Medicine issues two major public awards annually: the Gustav O. Lienhard Award for Advancement of Health Care and the Rhoda and Bernard Sarnat International Prize in Mental Health. In addition, the NAM issues awards to NAM members and staff in recognition of exceptional service to the NAM and the National Academies.

# Gustav O. Lienhard Award for Advancement of Health Care

The 2019 Lienhard Award was presented to **Patricia Gabow**, formerly of Denver Health and professor emerita of the University of Colorado School of Medicine.

Throughout her almost 50-year career, Gabow has led a multiyear, multiphase transformation at a public hospital system; served as a leading clinical investigator; and advocated for improving health care delivery through her writing, professorship, and board service. Gabow was the third woman in Denver Health's 150-year history to become its CEO, a role she held for 20 years. Under Gabow's leadership, Denver Health achieved extraordinary quality outcomes and financial stability, while staying true to its mission to preserve access to care for the most vulnerable.

During her tenure, Denver Health became recognized as the premier Level-One trauma system in Colorado, achieved an 80 percent immunization rate among low-income children, and had the lowest observed to expected mortality rate among 117 academic health centers nationwide. Gabow also shepherded the system to financial stability, while enabling it to provide over \$4.7 billion of care to the uninsured without increased City of Denver financial support. Because of her expertise in the care of vulnerable populations and safety net systems, she was appointed as a founding member of the federal Medicaid and Children's Health Insurance Program Payment and Access Commission.

Gabow began her career at Denver Health in 1973, when she started the health system's nephrology service. Her research on fluid and elec-

trolyte disorders and genetic kidney disorders has culminated in over 170 publications. For 15 years, Gabow served as principal investigator for the National Institutes of Health's largest clinical project on polycystic kidney disease. She was also a professor of medicine at the University of Colorado School of Medicine for 30 years.

Issued annually, the Lienhard Award recognizes outstanding national achievement in improving personal health care in the United States. Nominees are eligible for consideration without regard to education or profession, and award recipients are selected by a committee of experts convened



by the Academy. The award is accompanied by a medal and \$40,000, and the recipient is invited to deliver a lecture hosted by the NAM. The 2019 selection committee was chaired by **Don Berwick**, President Emeritus and Senior Fellow, Institute for Healthcare Improvement. The Lienhard Award is funded by an endowment from the Robert Wood Johnson Foundation. Gustav O. Lienhard was chair of the foundation's board of trustees from the organization's establishment in 1971 to his retirement in 1986—a period in which the foundation moved to the forefront of American philanthropy in health care. Learn more at [NAM.edu/Lienhard](https://nam.edu/Lienhard).



# Rhoda and Bernard Sarnat International Prize in Mental Health

The 2019 Sarnat Prize was awarded to **Daniel Weinberger** in honor of his fundamental role in elucidating the biological origins and genetic expressions of schizophrenia, and for transforming how clinicians, researchers, and the public understand mental illness.

Weinberger's research challenged conventional scientific thought focused on neurochemical causes of schizophrenia and changed the research paradigm to make brain science the centerpiece of schizophrenia research. He was the first to show that the genetics of schizophrenia involves early brain development and complications during pregnancy, including the resilience of the placenta to obstetrical stress. The results of his work have suggested that risk factors for schizophrenia, both genetic and epigenetic, are more strongly linked to early brain

In addition, Weinberger pioneered the application of neuroimaging in psychiatry research, and many of today's major, enduring findings on neuroimaging in schizophrenia have emerged from Weinberger's laboratory. His research discoveries on prefrontal cortex function have been widely replicated, and they are largely responsible for the prefrontal cortex being considered the main region of interest in many imaging and brain tissue studies related to schizophrenia. In addition, his pioneering research on gene mechanisms of brain circuit function spurred the creation of the National Institute of Mental Health's Research Domain Criteria program, which aims to develop a system for how mental health disorders are classified and diagnosed.

Since 1992, the Sarnat Prize has been presented



to individuals, groups, or organizations that have demonstrated outstanding achievement in improving mental health. The prize recognizes—without regard for professional discipline or nationality—achievements in basic science, clinical application, and public policy that lead to progress in the understanding, etiology, prevention, treatment, or cure of mental disorders, or to the promotion of

development than to the time of life when the diagnosis is made. His studies have also led to cognition being an outcome measure in most current treatment strategies for schizophrenia. In 2014, he was part of a landmark study that identified more than 100 regions in human DNA that can increase someone's risk for developing the condition.

mental health. The Sarnat Prize is accompanied by a medal and \$20,000. The award is supported by an endowment created by Rhoda and Bernard Sarnat of Los Angeles. The 2019 selection committee was chaired by **Karen Berman**, Johns Hopkins University. Learn more at [NAM.edu/Sarnat](https://nam.edu/Sarnat).

# NAM Member Awards



## Walsh McDermott Medal

**Cato Laurencin** received the Walsh McDermott Award in recognition of distinguished service to the National Academies of Sciences, Engineering, and Medicine over an extended period. Since his election to NAM in 2004, Laurencin has served on more than 20 committees and has held several leadership positions, including serving as a section chair on the NAM's Membership Committee. A devoted mentor and champion of early career and underrepresented minority scientists, Laurencin is currently a member of the Advisory Committee for New Voices in Sciences, Engineering and Medicine. Laurencin is known internationally for his research in biomaterials, drug delivery, nanotechnology, stem cell science, and a field he has pioneered, regenerative engineering.



## David Rall Medal

**David Savitz** received the David Rall Award for distinguished leadership as chair of a study committee or other such activity, showing commitment that far exceeds the position's responsibilities. During his 26 years of service to NAM, he has served on the Board on the Health of Select Populations and more than a dozen committees, five of which he chaired. Savitz's reputation as a skilled judge of evidence, a rigorous critical thinker, and a careful communicator of scientific findings and their implications have made him a highly sought committee chair. His committees have often taken on contentious, scientifically challenging issues, including electromagnetic radiation, Agent Orange and burn pit exposures among veterans, contaminated drinking water at Camp Lejeune in North Carolina, and the public health ramifications of e-cigarettes.



## Adam Yarmolinsky Medal

**Gail Wilensky** received the Adam Yarmolinsky Award, which honors a member from a discipline outside the health and medical sciences who has contributed to the mission of the NAM over a significant period. Wilensky is a nationally renowned health economist whose research focuses on Medicare reform, comparative effectiveness, and military health care. She has served on the NAM Council for two terms, as well as on the Boards on Health Care Services; Children, Youth, and Families; and Health Sciences Policy; and on the Policy and Global Affairs Division's Committee. She has served on nine consensus studies and steering committees. For 6 years, Wilensky was a member of the advisory board for NAM's Robert Wood Johnson Foundation (RWJF) Health Policy Fellowships and now serves on the Advisory Committee for the Culture of Health Program, providing leadership and insight for these distinguished programs.

# Staff Awards

Each year, the NAM presents three Cecil Awards recognizing and celebrating current and/or recent staff whose sustained service has contributed importantly to progress toward the NAM Mission—to improve health for all by advancing science, accelerating health equity, and providing independent, authoritative, and trusted advice nationally and globally. Each award is accompanied by \$4,000 and a commemorative medal.



## 2019 Sandra H. Matthews Cecil Award for Administrative Excellence

**Meg McCoy**

Director of Membership and Governance  
National Academy of Medicine



## 2019 Cecil Award for Individual Excellence

**Erin Balogh**

Senior Program Officer  
Health and Medicine Division

## 2019 Cecil Award for Excellence of a Group

**Laura Aiuppa**  
**Charlee Alexander**  
**Kyra Cappelucci**  
**Ivory Clarke**

**Rajbir Kaur**  
**Heather Kreidler**  
**Marc Meisnere**  
**Sharyl Nass**

**Imani Rickerby**  
**Toby Warden**  
**Mariana Zindel**

Clinician Well-Being Team  
National Academy of Medicine & Health and Medicine Division





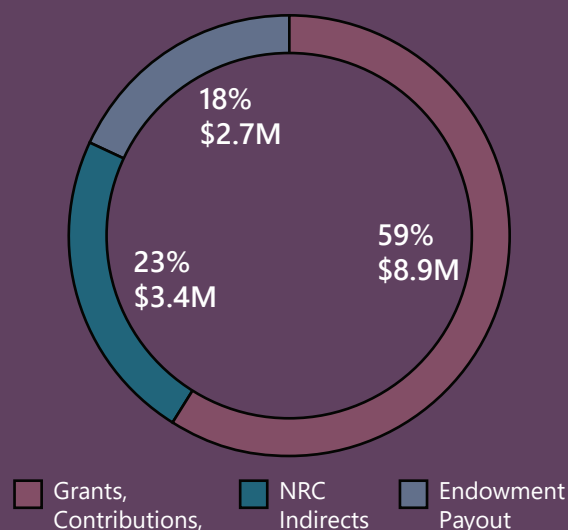
# Finances

## 2019 Revenues

**59%** of NAM revenues were from grants and contributions by external donors

**23%** of NAM revenues are from the indirect cost pool of the National Research Council, the primary source of funds supporting Operations

**18%** of revenue is from endowment payout, which supports both Operations and Programs



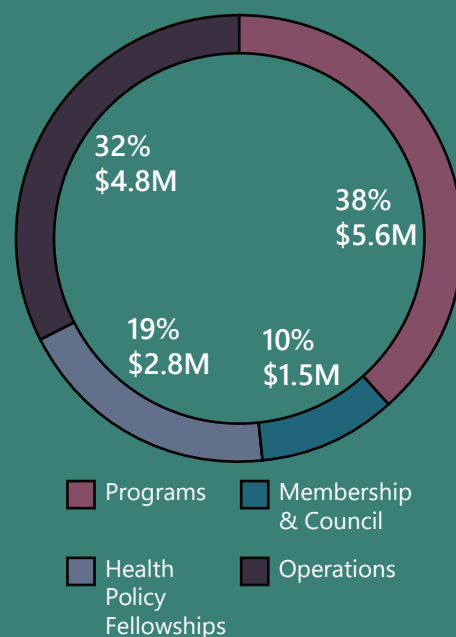
## 2019 Expenses

**58%** of expenses support program activities

**32%** of expenses support General Operations, including the President's, Executive, Development, Foreign Secretary, and Home Secretary offices

**10%** of expenses support Membership and NAM Council activities

**44** total staff at the close of the fiscal year with **2** additional positions under recruitment



The NAM budget supports two main areas of activity: *General Operations* and *Program*. *General Operations* includes the Executive Office as well as Development, Communications, Finance, Program Development, Membership and Council Services, and joint National Academies expenses. *Program* includes Culture of Health, Action Collaborative on Clinician Well-Being and Resilience, Action Collaborative on Countering the U.S. Opioid Epidemic, Healthy Longevity Global Grand Challenge, Vital Directions, and the Leadership Consortium for a Value and Science-Driven Health System, among other projects and activities. Fellowships are a distinct program and are reflected separately in the chart above.



## Donor Appreciation

We gratefully acknowledge the support of private contributors to the National Academy of Medicine. The collective, private philanthropy of our members and friends helps to enhance the NAM's mission to lead, inspire innovation, and impact the health of all people.

## 2019 Donor Appreciation

In 2019, contributions from private donors helped the National Academy of Medicine provide expert advice to the nation, inspire bold ideas around the globe, and build leadership capacity for the future of health and health care. We are deeply grateful for the generous support. Every gift helps the NAM promote its core mission and respond to urgent priorities. Highlights from the year include:

- **\$4.4 million** in new commitments
- **\$28.2 million** through Global Collaborators in the Healthy Longevity Global Competition
- **\$37,500** for the Action Collaborative on Responding to the U.S. Opioid Epidemic
- **573** NAM members and friends contributed **\$571,075** to the Annual Fund
- **30 percent** of NAM members made a gift to the Academies
- **11** new NAM Society Members (cumulative giving of **\$20,000–\$100,000**)
- **1** new Heritage Society Member (estate gift)

**Philanthropic gifts and grants make it possible for the NAM to fulfill its mission. We greatly appreciate all of the support received from our many members and friends.**



## Lifetime Giving

### The Einstein Society

In recognition of members and friends who have made lifetime contributions of **\$100,000** or more to the National Academy of Sciences, National Academy of Engineering, or National Academy of Medicine. Boldfaced names are NAM members.

#### \$1 Million or more

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**Richard** and Rita **Atkinson**  
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\* = deceased

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Susan and Franklin M. Orr, Jr.

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Richard F. and Terri W. Rashid

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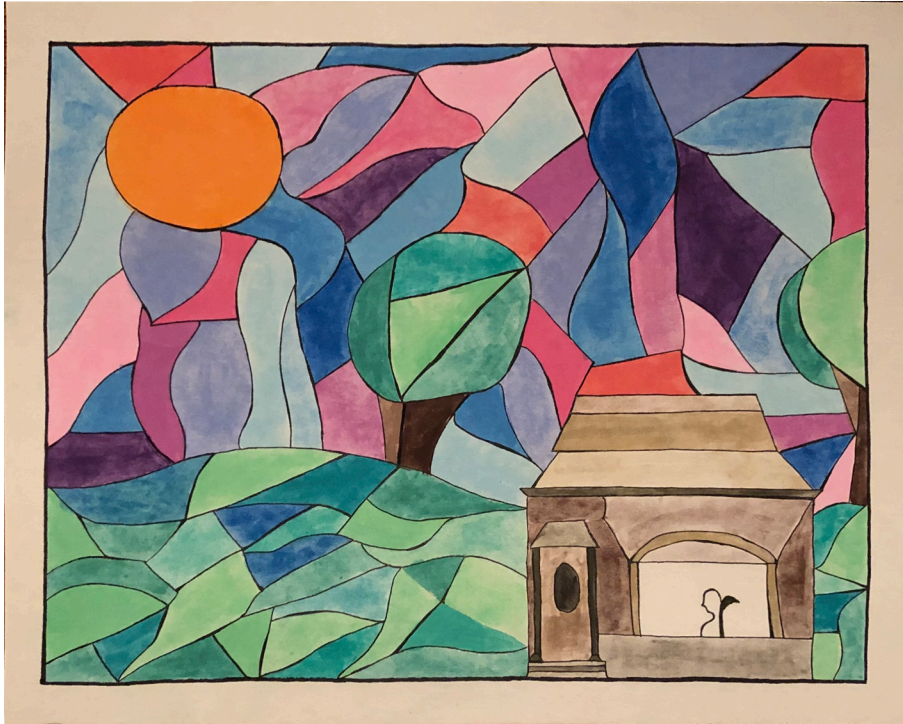
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The image on the cover is titled “Stained” by **Ruth Sanchez**, a student at Dell Medical School at the University of Texas at Austin. The artwork was submitted for the NAM’s Young Leaders Visualize Health Equity art show, an activity of the Culture of Health Program. Ruth’s artist statement reads, in part: “In my art, we see such a woman, isolated in her home, surrounded by beauty, but unable to enjoy the wonder that surrounds her. I hope people will see this art and realize that health is not just the care you receive or the money you have. It’s the choices we make day in and day out. It’s the forces around us having effect even when we have no choice. Health equity involves supporting people in the clinic and out, because health happens everywhere.” Copyright remains with the artist.

**See more art at [nam.edu/YoungLeaders](https://nam.edu/YoungLeaders)**

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