MEETING SUMMARY

PRESIDENT'S CANCER PANEL

DEVELOPING AND RETAINING A ROBUST AND DIVERSE CANCER WORKFORCE: CHALLENGES AND OPPORTUNITIES ACROSS THE NATIONAL CANCER PROGRAM

September 12 and 13, 2024
Virtual Meeting

The President's Cancer Panel (the Panel) hosted a 2-day virtual meeting to assess workforce challenges and identify approaches to improve training, recruitment, and retention of a diverse workforce for cancer clinical care and research. The meeting was open to the public via live feed, and members of the public were invited to submit written comments and questions during and after the event. Participants and observers were encouraged to post about the event on X and LinkedIn using the hashtags #NationalCancerPlan and #Every1HasARole.

This meeting summary was prepared to satisfy requirements established by the Federal Advisory Committee Act. The summary provides an overview of presentations and discussions occurring as part of the workshop and does not necessarily reflect the views of Panel members.

President's Cancer Panel

Elizabeth M. Jaffee, MD, FAACR, FAACP, FAAAS, FAIO, Chair

Mitchel S. Berger, MD, FACS, FAANS

Carol A. Brown, MD, FACOG, FACS

National Cancer Institute, National Institutes of Health

Samantha L. Finstad, PhD, Executive Secretary, President's Cancer Panel

Participants

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Alexandra Brown, MD, Chief Officer of Medical Quality, American Society for Clinical Pathology

Colleen A. Campbell, PhD, MS, LGC, President, National Society of Genetic Counselors

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Callisia Clarke, MD, MS, FACS, Chief, Division of Surgical Oncology, Associate Professor of Surgery, Medical College of Wisconsin

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James Fitzgibbon, DPT, MBA, President, Regional School Administrator, Kaiser Permanente School of Allied Health Sciences

Julie Louise Gerberding, MD, MPH, President and Chief Executive Officer, Foundation for the National Institutes of Health

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William McDade, MD, PhD, Chief Diversity, Equity, and Inclusion Officer, Accreditation Council for Graduate Medical Education

Larissa Nekhlyudov, MD, MPH, Professor of Medicine, Brigham and Women's Hospital, Harvard Medical School

Heather H. Pierce, JD, MPH, Senior Director for Science Policy, Regulatory Counsel, Association of American Medical Colleges

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Carolyn Seyss, PharmD, RUCIF, Fellowship Director and RPIF Alumna, Institute for Pharmaceutical Industry Fellowships, Ernest Mario School of Pharmacy, Rutgers, The State University of New Jersey

Lawrence N. Shulman, MD, MACP, FASCO, Professor of Medicine, Perelman School of Medicine, and Associate Director, Abramson Cancer Center, University of Pennsylvania

Kevin Sowers, MSN, RN, FAAN, President, Johns Hopkins Health System, and Executive Vice President, Johns Hopkins Medicine

Beth Steinberg, Associate Chief Nursing Officer, Critical Care, Emergency Services and Clinical Resources, The Ohio State University Wexner Medical Center

Mariana Stern, PhD, Professor of Population and Public Health Sciences & Urology and Associate Director of Population Sciences, USC Norris Comprehensive Cancer Center

Ishwaria Subbiah, MD, MS, FASCO, Executive Director for Cancer Care Equity and Professional Wellness, Sarah Cannon Research Institute

Caroline Sutter, DNP, Co-Director, Mason Center for Health Workforce, George Mason University

Nathan L. Vanderford, PhD, MBA, Director, Appalachian Career Training in Oncology Program, and Assistant Director of Pathway Programs and Student Success, University of Kentucky Medical School

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Robert A. Winn, MD, Director, VCU Massey Comprehensive Cancer Center

OPENING REMARKS

Dr. Elizabeth Jaffee welcomed invited participants and other attendees, introduced the Panel members, and read the Federal Advisory Committee requirements. Dr. Jaffee then reviewed the history of the President's Cancer Panel, which was established by the National Cancer Act of 1971 and charged with monitoring the activities of the National Cancer Program and reporting to the President of the United States on barriers to progress in reducing the burden of cancer.

In April 2023, with leadership from then–National Cancer Institute (NCI) Director Monica Bertagnolli, MD, the U.S. Department of Health and Human Services and NCI released the National Cancer Plan, a long-term initiative to meet the goals of President Biden's Cancer Moonshot. The plan is designed to facilitate collaboration, communication, outreach, and partnerships not only in the cancer research and care community, but across all sectors of society to make faster progress in ending cancer as we know it.

The Plan establishes eight goals that describe the progress needed to transform the meaning of cancer, one of which is to Optimize the Workforce. As monitors of the Plan, the Panel gathers information about progress toward the Plan's goals and identifies opportunities for improvement and acceleration. The Panel delivered an initial assessment to President Biden in February 2024. That report offered recommendations in five priority areas to accelerate progress toward the goals of the Plan:

- Increase investment in biomedical research
- Ensure access to high-quality insurance coverage for all
- Build a sustainable, robust, and diverse workforce
- Promote dynamic and sustainable community engagement
- Prioritize data sharing and integration to accelerate research

Continued progress against cancer will require collaboration across all sectors of the cancer community. The Plan is intended to be a living document that evolves as research continues, advances are made, and lessons are learned. This meeting and the report it informs will help shape the Plan's future.

Dr. Jaffee gave an overview of the meeting, its focus, and its format, which comprised a series of brief springboard presentations followed by cycles of facilitated discussion. She invited participants and observers to submit comments via the chat feature of the virtual platform during the meeting, and on social media or via email at any time. Input received during this meeting and through public comment until September 30 would be considered and inform the Panel's report to the President of the United States.

PART 1: CLINICAL CARE WORKFORCE

INNOVATION IN PARTNERSHIPS/RETAINING A DIVERSE CANCER WORKFORCE

Laura Long, MBA, Vice President of Operations, Performance, and Compliance with National Equity, Inclusion, and Diversity, Kaiser Permanente

In a recorded presentation, Ms. Long gave an overview of the lessons Kaiser Permanente has learned through its efforts to improve workforce diversity and retention.

- To attract and retain a diverse workforce, organizations must show commitment beyond words. Transparency, representation, and investment in workforce development go a long way toward

building trust. Employees must feel as though they belong, that they and their lived experience are valued, and that their organization sees their potential.

- Kaiser Permanente's workforce development programs have created an environment in which employees who join the organization in entry-level positions have the support they need to grow their careers, attain further education, and progress into new roles. It is important to address barriers to inclusion and advancement, including family responsibilities, education trauma, and the need for funding and guidance. Organizations should create clear and realistic paths toward career advancement.
- Strategies and partnerships must be developed around a strong evidence base. Analyzing data on the professional landscape and dimensions of diversity, such as race and ethnicity, age, sexual orientation, gender identity, and languages spoken, can help identify practical and actionable areas of need and opportunity.
    - To address the shortage of mental health professionals, Kaiser Permanente began offering counseling scholarships, mentorship opportunities, and access to clinical supervision. In 2023, the initiative supported 219 participants, of whom nearly 80% were people of color and almost 40% were bilingual.
    - Other investments and partnerships at Kaiser Permanente include a nursing scholar academy, a school of allied health sciences, and the Kaiser Permanente School of Medicine, all founded with the goal of meeting and supporting working professionals where they are. This intentionality carries through and yields meaningful results.

INVESTING IN AND SUPPORTING HEALTH-SECTOR CAREERS: PHYSICIANS, NURSES, AND ADVANCED PRACTICE PROVIDERS

SPRINGBOARD PRESENTATION

Larissa Nekhlyudov, MD, MPH, Professor of Medicine, Brigham and Women's Hospital, Harvard Medical School

Dr. Nekhlyudov gave an overview of the current state of the oncology workforce, particularly physicians, nurses, and advanced practice providers (APPs). Over the last 2 decades, the demand for oncology visits has skyrocketed, but this rise has not been matched by a proportional increase in capacity. The cancer care delivery system in the United States has also become more complex, with dramatic increases in both the number of cancer survivors and the administrative labor associated with providing care. A 2019 report from the National Academies of Science, Engineering, and Medicine identified significant geographic gaps in oncology care coverage, with many areas in the United States having few or no local oncology professionals. The cancer care workforce extends beyond oncology specialists; efforts to support the fields of cancer care and research should therefore take a multidisciplinary and multispecialty approach.

DISCUSSION

Challenges in Recruiting and Retaining a Diverse Workforce

- The gap between supply and demand for cancer care has been broadened not only by the rising population of cancer survivors but also by increases in the number and complexity of treatments and survivors' longevity. Projections and calculations of this gap may actually underestimate the extent of the problem.

- The burden of care per patient has also increased dramatically, leaving providers unable to see the same volume of patients they could a decade ago. Physicians have less time with their patients and must spend more time handling administrative tasks, including prior authorizations. To keep up with their caseloads, they must work longer hours, which feeds into demoralization and burnout.
- While some challenges are universal, others are more local. Solutions must be tailored to their settings, regions, states, and communities.
- Current care delivery is inefficient, with significant administrative burden, both of which contribute to burnout. People enter the cancer care workforce because they want to help patients. When their ability to do so is obstructed, their motivation and energy will wane.
- Limitations on compensation and reimbursement also contribute to difficulty with workforce recruitment and retention. This includes funding for training.
- Oncology as a field is not well represented or visible in medical education, including nursing schools. The Oncology Nursing Society (ONS) has initiated a partnership with a large university to provide elective courses in oncology nursing.
- The challenges of working in oncology are well known, and this negative perception discourages students and professionals from considering this specialty.
- Organizations may task already-overtaxed care team members with implementing recruitment and retention efforts in addition to the rest of their work. This is not a sustainable approach.
- Healthcare professions are often siloed, which may further limit the accuracy of projections of cancer care supply and demand. The Association of American Medical Colleges is working with the RAND Corporation to refine the way these projections are calculated. Creating successful estimates will require a significantly greater volume of data than is currently available.
- Workforce shortages are not evenly distributed across all roles. In some areas, physician assistants, nurse practitioners, and others may be able to step up or be deployed to help fill care team gaps.
- Telemedicine may help support oncology care in regions without cancer centers or local specialists.
- Payment models have not kept up with the changes in the way care is delivered.
- The majority of medical programs are homogenous, with little to no representation of Black and Hispanic/Latino trainees. Representation in medical training can beget representation in the workforce, and professionals from underrepresented communities often go on to serve their own communities, thus helping ensure care in the areas that may need it most.

Solutions for Recruiting and Retaining a Diverse Workforce

- Successful strategies will encompass the entire cancer workforce pipeline, beginning in kindergarten. Students need exposure to the field, support in pursuing it, and opportunities to stay on track. ONS is collaborating with the National Student Nurses' Association to introduce nursing students to oncology. Oncology nursing is a second career for many, particularly those whose adult lives were touched by cancer. Connecting with organizations to raise awareness of oncology careers can help draw working professionals to the field.

- Some sectors of the workforce (e.g., oncology clinical pharmacists and other APPs) may represent untapped resources. Shifts in payment models would be needed to allow these professionals to maximize their contributions, as they cannot currently bill for some of the services they are qualified to provide. Grant funding is needed for APP fellowship programs.
- Community engagement through mechanisms such as community advisory committees supports both better care delivery and greater community interest in healthcare sector careers.
- Approaches to workforce recruitment are often siloed by role or specialty. Improving the visibility of cancer care and research as a field, rather than by specific job title, may help drive interest.
- Just as rural and remote areas may lack access to oncology care, they may also lack training opportunities for local students and professionals interested in the field. A.T. Still University's (ATSU's) 4-year medical school program involves 1 year on the campus in Mesa, Arizona, and 3 years in community health centers across the country. Similarly, the university's Hometown Scholars program helps ATSU meet the needs of community health centers by identifying, attracting, and educating dedicated, motivated, and qualified community-minded healers.
- Physicians expend much of their time and energy on administrative tasks such as prior authorizations. More of that work could be shifted to the payors and other decisionmakers who require it.
- Numerous smaller-scale collaborative models are finding success. The American Society of Clinical Oncology (ASCO) runs a multidisciplinary Oncology Summer Internship program, developed to expose students from historically underrepresented groups to careers in oncology.
- The complexity of cancer care has increased, but onboarding and training for new staff members has not kept pace, particularly for employees who joined during the early days of the COVID-19 pandemic. Employers should invest in providing more comprehensive skills training to ensure professionals feel competent and confident in their daily tasks.
- Seasoned staff members are leaving the workforce in the hands of those with significantly less experience, which can result in quality and safety issues. These senior team members could be given supervisory roles to help train and offer insights to their successors.
- The highly technical and rapidly evolving field of oncology care may be daunting to healthcare professionals who have worked in other specialties. Rather than requiring new or prospective additions to the cancer care workforce to acquire further degrees, employers should consider badging or micro-credentialing, an approach that has worked in the technology sector.
- There is a large pool of students and trainees who have been prevented by various social and financial barriers from entering or remaining in the cancer care workforce. Historically Black colleges and universities (HBCUs) and minority-serving institutions (MSIs) matriculate many would-be members of the cancer care workforce, but these motivated and skilled individuals are effectively turned away by the current exclusionary state of the field.
- Community health workers (CHWs) are often inspired by personal experience to enter the healthcare field. These individuals have much to offer but may be overlooked as a resource. They also need additional training, funding, and career support to do their jobs effectively and not burn out.

- K–12 students may be interested in science, technology, engineering, and mathematics (STEM) careers but lack understanding of the path to those professions and the broad range of ways to succeed in them. They may believe that they need perfect grades or to come from a certain background; to dispel these ideas, students need to hear from real professionals in their community.

INVESTING IN AND SUPPORTING HEALTH-SECTOR CAREERS: LAB TECHNICIANS, MEDICAL ASSISTANTS, NAVIGATORS, AND OTHERS

SPRINGBOARD PRESENTATION

Kevin Sowers, MSN, RN, FAAN, President, Johns Hopkins Health System, and Executive Vice President, Johns Hopkins Medicine

Mr. Sowers gave an overview of the current state of workforce challenges facing laboratory technicians, medical assistants, patient navigators, and others. Over the next 2 to 3 decades, the increasing burden of cancer and demand for cancer care will further outpace workforce capacity. Today, allied health professionals comprise approximately 60% of the workforce, yet public awareness of these career paths is low, and educational programs are underfunded. Employers may not invest in career development for allied health professionals in the same way they do for physicians, nurses, and APPs; this can create a ceiling, which discourages people from entering or remaining in the workforce. Competition across industries also presents a challenge; many individuals who might have previously pursued technical roles in healthcare may now be drawn to other sectors, such as online retail, by the promise of better pay. In addition, working in oncology typically requires specific skills and experience, which significantly limits the pool of eligible applicants and increases the time it takes to fill these positions. In general, work–life balance is a higher priority now than in the past, deterring individuals from considering healthcare careers. Finally, increased rates of violence in healthcare settings contribute to professionals' leaving or deciding not to enter these environments.

Successful recruitment and retention strategies will address these issues and create a desirable work environment. Competitive salaries, sign-on incentives, accelerated hiring processes, and job training and career development opportunities all demonstrate investment in employees.

Johns Hopkins Medicine has begun implementing these strategies and others, including outreach in underserved communities and among individuals who have reentered the community after being imprisoned. The organization offers English as a Second Language classes for new hires and apprenticeships to build skills and support retention. It has partnered with K–12 schools, community colleges, and training programs and has hired high school students to work in laboratories, allied health areas, and inpatient and outpatient units. The organization is also collaborating with the state government to recruit high school students to spend their paid year of service working in healthcare.

Clarifying Questions for Presenter

- Johns Hopkins has direct ties with academic institutions both within and outside its system, including state universities and community colleges. The organization has also developed its own schools for allied health and technical careers.
- Ensuring that individuals feel valued and as though they are part of the care team is essential to reduce turnover. A successful workplace culture fosters teamwork and respect for all members. Another essential component is competitive pay and benefits, including remote and flexible work options wherever possible.

- Since the beginning of the COVID-19 pandemic, it has become more common for candidates to fail to show up for interviews. Batch interviews and rapid hiring at job fairs help ensure that qualified candidates follow through and complete the application and interview process.
- Johns Hopkins provides additional compensation for senior professionals who take on preceptorships. The investment makes it clear that their knowledge, experience, and contributions are valued, which helps retain them. The organization has also implemented regular evaluations to ensure preceptors do not become overburdened or burned out by their work.

DISCUSSION

Solutions for Recruiting and Retaining a Diverse Workforce

- The National Navigation Roundtable's Workforce Development Task Group recently published a resource for administrators to create job descriptions for navigators with specific levels of expertise, and to help patient navigators advance their careers.
- The American Society for Clinical Pathology (ASCP) has outreach initiatives for K–12 students, including interactive Lab Drawer kits that provide hands-on experience with skills such as venipuncture and microbiology. The society has a large network of career advocates and exhibits at high-school counselor professional meetings to raise awareness of pathology.
- An alternative framework for envisioning the healthcare workforce is as a highway rather than a pipeline, as highways have many lanes (roles, subfields, or specialties), entrances, and exits. Professionals can travel across lanes and may enter the highway from many different places. Nurses, for example, may be hesitant to change lanes into oncology, as specialized skills and knowledge are needed. Trainings and micro-credentialing will help them feel more confident shifting to oncology. Many participants expressed appreciation for the highway framework.
- Many high schoolers are interested in acquiring job skills; there may be opportunities to provide trainings or credentialing for early-career tasks and roles. Attendees agreed that technical high schools and colleges represent an untapped resource, as students in these institutions are already oriented toward building practical skills and joining the workforce. Providing on-ramps for high school students also helps prevent students from being drawn into other industries, such as online retail, as soon as they graduate.
- The National Society of Genetic Counselors (NSGC) is collaborating with the American Society of Human Genetics and the Minority Genetic Professionals Network to conduct outreach to high school and college students. It is crucial to increase diversity in this field; 87% of genetic counselors identify as White, which can negatively affect trust and care relationships in underrepresented communities. Virtual career fairs and paid internships have proven to be effective strategies for exposing students to the field and nurturing their career development, while simultaneously providing a much-needed bolster to the cancer workforce. Students who participate in the internship programs are likely to both join the field and stay in it.
- Many institutions and organizations have their own workforce pipeline initiatives. It could be useful to collaborate across institutions to link data, pool resources, and expand opportunities.
- Some healthcare career tracks, such as becoming a physician, are straightforward, but many are not. Creating clear career development pathways with trainings, credentials, and certifications would help both employers and professionals.

    - One example is the pharmacy technician career ladder, which lays out a direct and standardized path to advancement, development, and commensurate increases in compensation, thereby increasing recruitment and retention.

- Physicians are reimbursed for attending conferences and completing continuing education activities, but people in many other roles are not. A reimbursement model for career development would help ensure that professionals can afford to advance their careers and stay in the field. Loan repayment programs are another important mechanism available to physicians but not to professionals in other roles.
- Interaction with patients is an important part of gaining competence and confidence for many oncology roles. Generative artificial intelligence (AI) tools may be able to support career training by offering simulated one-on-one patient experiences.
- Any changes to professional certification will have to be made in cooperation with state and national licensure boards and other regulatory bodies. In Illinois, a training and board certification process will provide credentials to CHWs and make them eligible for reimbursement from the Centers for Medicare & Medicaid Services (CMS) under the new Current Procedural Terminology (CPT) codes for patient navigation.
- ASCP is one of the largest certifiers of medical laboratory professionals. Hospitals used to require certification in new hires, but the growing shortage of professionals has prompted a reconsideration of that standard. The ASCP website includes a tool that allows students and professionals to identify possible career paths and roles based on their experience, education, and training. The society also offers an alternate pathway for military service members. It will be important to broaden the pool of people who can become certified without diluting the value of certification.
- Many non-physician roles, including CHWs and genetic counselors, are not reimbursed by CMS, which means that hospitals and other health systems in under-resourced areas are not able to support these vital positions. NSGC helped develop the Access to Genetic Counselor Services Act, which would secure reimbursement for genetic counselors and help create jobs.

STRENGTHENING HEALTHCARE ENVIRONMENTS TO PROMOTE WORKFORCE RETENTION & WELLBEING

SPRINGBOARD PRESENTATION

Ishwaria Subbiah, MD, MS, FASCO, Executive Director for Cancer Care Equity and Professional Wellness, Sarah Cannon Research Institute

Dr. Subbiah gave an overview of challenges and opportunities related to workforce retention and employee wellbeing. Although professional burnout in the cancer workforce has increased dramatically in the last few decades, it is not a new problem; a 2014 study found that 51% of community oncologists reported symptoms of burnout, and surveys of other care team roles have identified similar trends.

Wellbeing is often thought of as an individual concern, but system-level well-being is equally important, particularly in stressful healthcare settings. The Stanford Model of Professional Fulfillment demonstrates the interrelated needs for organizational wellness, which combines personal resilience with a culture of wellness and efficiency of practice. Bridging these two sides is professional fulfillment, or finding meaning in work. Individuals are motivated to join the healthcare workforce because they want to make a

positive difference. An effective workplace facilitates and prioritizes meaningful work and employees' contributions. These drivers are quantifiable with validated measures; employers should take an evidence-based approach to evaluating their culture and organizational health. Medicine does not have a personal resiliency deficit; studies demonstrate that, on average, physicians have higher resiliency than most Americans. Yet even the most resilient medical professionals are reporting symptoms of burnout and need more support from their organizations.

The driver dimensions of wellbeing, including finding meaning and feeling valued, are defined and measurable, as is their impact. Organizations should implement data-driven solutions, beginning with using validated measures to evaluate organizational and employee experience. Burnout in medicine is rarely the result of a single event; rather, it intensifies over years as an employee accumulates negative experiences, some of which may appear insignificant on the surface or to an outsider. Discrete inefficiencies, frustration, and microtraumas in the workplace add up to a burden of stress that can push a professional to their breaking point. Stressors cluster differently depending on role and other factors, so data-based solutions should be responsive to each organization's unique makeup and needs.

The US Oncology Network established an oncology professional wellbeing plan, developed with the same rigor and level of stakeholder input as the network's strategic plan. The approach has three facets:

- Establish the wellbeing infrastructure and evidence-based framework for professional wellbeing across the network.
- Use a validated approach to measure actionable drivers of wellbeing to show impact over time.
- Provide end-to-end guidance to support practices in their action planning.

The network has made infrastructure development a multi-year priority, launching the wellbeing strategic plan and the Network Clinician Wellbeing Council. Insights from stakeholders included:

- Integrate wellbeing metrics (e.g., measuring task load burden) into every initiative's development.
- Check perceptions; develop a data-driven approach.
- De-implement; define a project's success by measuring its impact, not just its implementation. Sunset initiatives as appropriate.
- Be solutions focused; use guiding principles in the design and implementation of solutions.
- Don't lose sight of the unique needs of each team member.

Clarifying Questions for Presenter

- Dr. Subbiah is not aware of any organizations that embed wellbeing metrics into their initiatives. Key to the advancement of these ideas is organizational leadership buy-in and participation in stakeholder discussions. Dr. Subbiah has witnessed firsthand the effect on leadership of hearing from clinicians about seemingly small frustrations, challenges, and inefficiencies that add up to a significant waste of time and effort over the course of a day.
- The term *microtraumas* refers to negative events that occur with some frequency in the professional setting but are often invisible to others, such as an abusive message from a patient or family member or dealing with prior authorizations. There are no set criteria, although there is often consensus or resonance among individuals regarding what constitutes microtrauma.

- The US Oncology Network recognized that dedicated effort would be needed to address workforce burnout and retention issues. In the absence of established approaches, the organization opted to invest in solutions internally. Organizations may be more open to dedicating resources to wellbeing initiatives at times of transition, such as when new leaders join.

DISCUSSION

- A significant body of resources supports this work, including those resulting from the National Academy of Medicine's Action Collaborative on Clinician Well-Being and Resilience. To effect change, policies and efforts must be implemented at all levels, from federal (e.g., prior authorization reform) to organizational (e.g., providing clinicians with the resources they need to support their patients and avoid burnout and moral injury). Providers may be required, for example, to ask patients about social factors such as food and housing, yet may not be supplied with the tools to assist patients who confirm that they need help.
- The Accreditation Council for Graduate Medical Education includes a 15-question wellbeing assessment in its annual residents' survey. The results are reported back to the residents' programs to support quality improvement. One insight from the survey responses is that trainees' and residents' experiences are often different from those of the dominant culture in their workplace; consequently they may experience additional stressors, microaggressions, and harms that their supervisors do not.
- Interpersonal harms perpetrated by colleagues and supervisors should be addressed directly and systematically, rather than in private one-on-one conversations with the offenders. Handling transgressions behind closed doors creates missed opportunities for dialogue and does not demonstrate solidarity with or accountability to those who have been harmed.
- The Oncology Nursing Society (ONS) has created a Nurse Well-Being Learning Library to address different facets of wellbeing, including intellectual, creative, physical, emotional, and spiritual. This resource is free to society members and the public.
- Many supportive resources exist, but professionals may not be aware of them. In addition to raising awareness among existing staff, organizations should include information about professional development, wellbeing initiatives or support, and career pathways in their onboarding processes for new hires.
- The Health Resources and Services Administration has invested in workforce wellbeing, including through a survey and a website with resources. One of the agency's major takeaways from conversations with experts and stakeholders is the importance of "worker voice": the ability to speak honestly in the workplace about bad experiences, such as discrimination, without fear of retaliation. Labor organizing and unions are one part of ensuring that workers feel they have a voice.
- The Partners for Nurse Staffing Think Tank was launched in January 2022 in response to pandemic-intensified nurse staffing shortages. The think tank identified high-priority areas for recommendations that could be implemented within a 12-to-18-month timeframe. One recommendation was to elevate clinician psychological and physical safety to equal importance with patient safety through federal regulation.

- Organizational leaders may be many steps removed from practicing in the clinic and thus not be exposed to the daily stressors their staff experience. 360-degree feedback models offer professionals the opportunity to provide input to their supervisors.
- The Johns Hopkins Medicine Resilience in Stressful Events (RISE) team is a multidisciplinary group of trauma-informed providers who provide support to healthcare team members after difficult or traumatic workplace experiences.
- Many organizations regularly assess and report on the health of their departments. Metrics for these evaluations should include items on employee burnout.
- Wellbeing resources should not be nested within human resource departments, as these offices are associated with termination and punitive measures for workplace infractions. It will be challenging for employees to fully benefit from initiatives if they fear speaking honestly about their experiences.

LEVERAGING TECHNOLOGY TO IMPROVE CARE DELIVERY

SPRINGBOARD PRESENTION

Othman Laraki, MS, MBA, Chief Executive Officer, Color Health

Color Health is a 10-year-old company that uses technology to deliver clinical services directly to large populations. The organization has partnered with the American Cancer Society to provide accessible and comprehensive cancer prevention and screening for the highest-burden cancers, including breast, prostate, lung, cervical, and colorectal, for more than 150 million Americans who receive healthcare through their employer or union. The goal of the program is to use technological tools to address gaps at each stage of the cancer journey to improve outcomes:

- Prevention: Increase awareness and education around ways to prevent cancer.
- Screening: Improve access to screenings and follow-up after a positive screen; 65% of Americans are not up to date on their cancer screenings, and 41% of people with an abnormal colon cancer screening result do not receive follow-up testing.
- Treatment initiation: Reduce delays in referring diagnosed patients to care and delays in beginning care; on average, it takes 70 days for a newly diagnosed patient to be seen at an academic medical center.
- Active treatment: Address barriers to accessing care and making informed decisions.
- Survivorship: Increase support for chronic conditions that can occur after cancer and treatment; 50% of cancer survivors live with multiple chronic conditions resulting from their treatment.

Provider scarcity affects patient outcomes throughout the cancer journey. Guidelines are nuanced and updated regularly, and providers must spend time staying up to date. Primary care providers must be aware of a wide breadth of patient-specific factors such as family history, genetics, lifestyle, and previous health history. If a physician with an average patient load followed the recommended guidelines for preventive care alone, it would take more than 14 hours per day. Experts project that the shortage in primary care providers will reach between 13,500 and 86,000 by 2036. Much of providers' time is spent documenting their work, rather than attending to patients. The impact of provider scarcity is not evenly distributed, but rather exacerbates existing health disparities. Patients from marginalized communities and those in remote areas are more likely than others to bear the brunt of workforce shortages.

Barriers to timely diagnostics and workup include the challenging nature of transferring patients from primary care to specialty care. Primary care providers and others involved in diagnosis may not know the specific workup needed to inform treatment, and so oncology offices spend hours reviewing new patient records and attempting to identify missing information. There is also a shortage of medical oncologists, particularly in rural and remote areas.

Technological tools and strategies can help support patients (by improving outcomes despite these limitations) and providers (by reducing burden by automating lower-skill tasks such as appointment notes, scheduling, and billing).

Color Health's Cancer Copilot program has six objectives:

- Earlier cancer detection
- Better and faster care post-diagnosis
- Building clinician confidence and trust in decisions
- Integration of tools into existing workflows
- Decreased administrative burden
- Faster delivery of high-quality care

In collaboration with OpenAI, Color Health has begun exploring two clinical use cases: (1) generating guidelines-based care and cancer detection plans specific to an individual's risk and (2) identifying missing diagnostic workups ahead of first oncology appointments to help initiate treatment faster. Color Health's generative AI tools are being developed with an emphasis on safety and privacy. Design features include a hands-on "clinician-in-the-loop" interface, making both general and institutional guidelines more accessible to the large language model (LLM), and a rigorous evaluation system to ensure that the tools are achieving its objectives. Together, the tools may support scaling of high-demand clinical expertise, increase determinism and decrease AI "hallucinations" and variation, improve observability to increase trust and quality, and avoid dependency on accessing real patients' protected health information to train the model.

Clarifying Questions for Presenter

- Color Health is working to ensure that the tools do not create additional burden for PCPs. At present, it takes about 5 minutes for a provider to generate a workup plan using Color Health's technology. Although the tool does take time to use, its features may help automate other tasks to free up providers' time and effort. User-centered development helps ensure that learning to use the tools is intuitive, and in the long run, the tools should reduce time and effort associated with administrative tasks and clinical decision-making for both PCPs and oncologists.
- The generative AI tool is trained to follow specific rules, rather than automatically drawing on specific sets of guidelines. Each organization can adapt the rules or input to ensure the tool is consulting the most relevant and up-to-date guidelines for its patients.
- The tools are developed with a user-centered model, ensuring that learning how to use them will not be burdensome for providers.
- Color Health's tools should not influence or change liability related to clinical decision-making, as human providers are still making the ultimate care decisions.

DISCUSSION

Opportunities for Technology to Support Clinical Workflow

- Electronic health records (EHRs) are designed to support billing and administration rather than clinical tasks. They are not designed to present medical information in an accessible way or facilitate communication between care team members. Making EHR interfaces more useful to care team members could dramatically increase efficiency and safety and reduce administrative burden and burnout.
- Expanding coverage for telehealth and facilitating team-based telehealth access will help improve communication and reduce burden on both patients and providers.
- AI tools for ambient notetaking could reduce care team members' administrative workload during and after appointments.
- Tools like the Patient-Reported Outcomes Measurement Information System can be offered in multiple languages and help care teams better understand patient needs and experiences, thereby increasing the efficiency of patient interactions. The My Wellness Check program delivers computerized assessments to cancer patients and has been shown to decrease emergency department visits and hospital admissions.
- LLMs and other AI tools have promise but are only as accurate as the humans who develop and train them. If the development process and training datasets are homogenous or exclude data from marginalized populations, the tools cannot provide accurate insights for these patients and in fact may exacerbate health disparities for vulnerable communities.
    - The President's Cancer Panel will soon release a report that discusses the need for responsible development and use of technology to support cancer patient navigation.
    - Transparency is an important value in the development of AI tools.
    - Health information technology (IT) professionals are an important part of the healthcare workforce. Diversity in the health IT sector will help ensure that tools are more inclusive and accurate and support health equity.
- Resource gaps must be identified before technological tools that actually support care teams can be developed and implemented. Tools should provide ways for team members to smoothly transition tasks to share workload and optimize each person's time and skills.
- The most effective new tools will address pain points for both patients and clinicians. Symptom monitoring tools integrated into patient portals can help support cancer patients and their care teams.
- At present, clinical decision-making is complicated or obstructed by the EHR interface. Pathway tools can help ensure that clinicians are providing care concordant with the most up-to-date guidelines. These tools are costly and require significant up-front investment of time and money to implement and learn but have shown success in improving efficiency and accuracy of decision-making. Funding would be needed to support the widespread adoption of these tools.
- An implementation science lens should be used when considering the development of new tools that will be added to the workstream.

- Long-term survivorship care represents a growing and untenable burden on oncology practices. Tools for telehealth and remote symptom monitoring could reduce this strain.
- Platforms like Unite Us help identify social needs such as housing and food access and connect patients to resources. Patients whose social determinants of health (SDOH) needs are met are more likely to be able to get the care they need, complete treatment, and experience better health outcomes.
- Technological tools to support healthcare could be used in environments outside of health systems or clinics. Some components of care that currently require appointments with healthcare teams, such as blood draws, could perhaps be outsourced to sites such as pharmacies, labs, and grocery stores. This would be especially useful in geographic regions with few or no oncology providers.

DISCUSSION WITH PANEL AND PUBLIC COMMENT

The Panel opened the floor to participants for their closing thoughts at the end of the clinical workforce segment of the meeting.

- It takes a village to support cancer patients and caregivers. Solutions must be informed by a broad perspective and take into account the many important roles involved in clinical care.
- Prior authorization requirements hinder the delivery of timely, effective, and evidence-based care, and this issue has been exacerbated by payors' increased reliance on AI tools for determining coverage. The tools overwhelmingly and inappropriately deny prior authorization requests, multiplying work for care team members and delaying treatment for very sick patients.
- The Morrill Land Grant College Act of 1862, which set aside federal lands to create agricultural and engineering colleges, could serve as a model for incentivizing oncology education and career paths.
- "Grow your own" programs within institutions help create and retain a robust workforce. These programs can be sponsored through the government and public–private partnerships and have proven effective.
- Reimbursement is a serious issue beyond prior authorization. Current models must be reimagined in order to support the way cancer care is delivered now, or outcomes will continue to worsen in an increasingly overburdened system.
    - Revisions to the payment infrastructure could shift the cost of time spent on some payor-required administrative tasks away from care providers.
- Codifying healthcare guidelines in plain language could improve comprehension and help ensure efficiency of care delivery across care team roles.
- Cancer survivors should not be relegated to a lower tier of care or lower-touch care models. All patients deserve equal access to care through the entire cancer journey.
- The rising complexity of care also reaches into pathology, lab tests, and biomarker analysis. The pathology workforce should be included in any discussions of cancer workforce support.
- Workplace wellbeing efforts must be accompanied by a formalized system of accountability.

- The government should expand the Food and Drug Administration's (FDA's) purview to include oversight of health technology, particularly tools used in clinical settings.
- Increasing awareness about oncology careers among K–12 students is very important. Students who know about the many roles and ways to contribute will be more motivated to pursue the field.
- Supporting the workforce is an essential part of ensuring that patients get the care they need in time. Shortages in the cancer care workforce are harming both professionals and patients.
- The NSGC recommends adding provisions to enhance Medicare beneficiary access to the services of genetic counselors, which would support high-quality, coordinated care for all patients. The Access to Genetic Counselor Services Act introduced in Congress in 2023 (H.R.3876 and S.2323) aims to support this access.
- Many different care team roles in the workforce experience similar issues. Compiling and evaluating data across "highway lanes," rather than evaluating data in silos based on role, would create a fuller picture of gaps and opportunities.
- Providing more funding for cancer prevention efforts in clinics and community health organizations would help reduce cancer rates and consequently lower medical costs and strain on the cancer care system.
- Organizations should take a local approach to supporting the workforce, tailoring outreach and engagement efforts to the needs of the community and their current and prospective employees.
- Since 1997, support from the federal government for the training of physicians at the residency and fellowship level has been capped. Additional support will be needed to increase the workforce to meet growing demand. The Resident Physician Shortage Reduction Act (H.R.2389), introduced in 2023, aims to increase the number of residency positions eligible for graduate medical education payments under Medicare for qualifying hospitals, including hospitals in rural areas and health professional shortage areas.
- Recent Supreme Court decisions have created barriers to supporting a diverse workforce. Targeted efforts to increase diversity and inclusion are now in opposition to political efforts and legislation. Succeeding in the face of this obstruction will require collaboration and creative strategies. One such strategy is linking admissions to medical education programs to an institution's mission and values, which should include ensuring access to care for those who are underserved. Accreditors of graduate medical education should also prioritize these values and not abandon their stated commitment to diversity.
- Organizations should invest in maintaining academic partnerships in their communities, which will increase interest in oncology care professions.
- Improving the availability of workforce data will facilitate research that can in turn inform new policies.
- CHWs represent an untapped resource. Incorporating these professionals into multidisciplinary care teams and workflows would allow other members, including physicians, to work at the top of their skills and credentials.

PART 2: RESEARCH WORKFORCE

CREATIVE PARTNERSHIPS/DIVERSITY IN CLINICAL TRIALS AWARDS PROGRAM

Robert A. Winn, MD, Director, VCU Massey Comprehensive Cancer Center

Although clinical trials are becoming a standard of care, not all patients can access that care. Across the globe, at-risk populations, including racial and ethnic minorities, uninsured and socioeconomically disadvantaged individuals, and those in rural communities all experience worse cancer outcomes while simultaneously having the least access to clinical trial participation. In addition, the existing clinical research workforce largely lacks the skills and training to effectively increase diversity among trial participants.

The Robert A. Winn Career Development Award (Winn CDA) program was created to address these disparities. The program's vision is to transform the clinical research landscape by building and strengthening partnerships between clinical investigators and the communities where their patients reside, with a goal of engaging a patient population that mirrors the epidemiology of the disease studied. In a departure from other efforts, which rely on community outreach to increase diversity, the program focuses on developing a workforce that both reflects and can serve the populations in greatest need. The program supports traditional training in research methods, design, and implementation, plus a modified community-based participatory research approach.

The award was established in 2020 with an initial investment of $122 million from the Bristol Myers Squibb Foundation and additional support from Gilead Sciences and Amgen. Winn CDA implementation partners and collaborators include VCU Massey Comprehensive Cancer Center; the American Association for Cancer Research (AACR); Conquer Cancer, the ASCO Foundation; and the American Heart Association (AHA). The program is overseen by national advisory groups, mentors, subject matter experts, and local site partners in 11 cities across the United States.

The Winn CDA program combines funding, training, protected time, and mentorship to not only encourage but also actively support increased enrollment of diverse groups in clinical trials. The program takes a Community-Oriented Clinical Trialist training approach with an aim to train a new generation of world-class clinical trialists who possess the additional knowledge and competencies to foster active community engagement in clinical and translational research.

Between 2021 and 2027, the program will support 616 awardees across four tracks:

- Career Development Award (Winn CDA): A 2-year program for early-stage investigator (ESI) physicians from underrepresented backgrounds or those who have demonstrated a commitment to increasing diversity in clinical trials
- Clinical Investigator Leadership Award powered by Conquer Cancer's EveryGrant (Winn CILA-Onc): A 3-year program for Winn CDA cancer graduates
- Clinical Investigator Leadership Award implemented by AHA (Winn CILA-CV): A 3-year program for Winn CDA cardiovascular disease graduates
- Clinical Investigator Pathway Program (Winn CIPP): A 6-week externship for medical students from underrepresented or disadvantaged backgrounds

The program's approach has proven effective. Awardees report high levels of satisfaction and not only develop thoughtful, high-impact clinical trials but also successfully recruit participants from at-risk and rural populations. More than 60% of participants also said that as a result of their project, their institution began to adopt more community-oriented approaches.

Clarifying Questions for Presenter

- One critical success factor for the program was recognition by Bristol Myers Squibb that the program would go farther without a pharmaceutical company's name attached. Opening the program to other partners helped it grow. Another success factor is the involvement of professional associations such as ASCO, AACR, and AHA, as well as government agencies such as the FDA and National Institutes of Health (NIH).
- Although Winn CDA graduates do not receive a special certification, they finish the program with a research protocol that is ready to launch within their institution. The program may consider certification in the future.
- The program has many partner institutions, ranging from large academic cancer centers to smaller colleges and universities in remote and rural areas.

ENTRY TO THE RESEARCH WORKFORCE & CAREER ADVANCEMENTS

SPRINGBOARD PRESENTATION

Nathan L. Vanderford, PhD, MBA, University of Kentucky Medical School

Dr. Vanderford gave an overview of trainee, mentor, and training program challenges in the cancer research workforce. Research training is complex and difficult, an opportunity for trainees to become more independent and resilient. It is also rewarding and important, as trainees contribute to scientific progress and discovery. Trainees, mentors, and training programs all have their own rights and responsibilities. Because multiple issues can complicate research training, there are many opportunities to improve the experience.

An important question to ask is "What is the purpose of academic research training?" There has long been an assumption of an apprenticeship model, in which trainees commit to an academic path. Yet today, many trainees bring their education and experience to industry rather than remaining in academic research.

Trainees experience numerous challenges, both professional and personal, including:

- A hypercompetitive environment, with high demand for jobs and funding and low supply
- Mentor challenges (e.g., poor mentorship, harassment)
- Work–life balance concerns
- Career path decisions
- Mental health issues, including stress, anxiety, depression, loneliness, and imposter syndrome
- Financial pressures
- The trade-off of spending time in training rather than pursuing full-time employment
- The high cost and low budgets of training programs

Although the number of PhD graduates has steadily risen over the past few decades, the number of faculty positions has largely remained flat, leading to increased competition and high likelihood that some trainees will be unable to find work in academia. As of 2022, only 26.9% of recent doctoral graduates found work in academia, while 54.1% took jobs in industry.

Mentorship is a key aspect of success for trainees, yet mentors experience their own challenges, including time constraints and a lack of protected time for mentorship activities, personal and mental health issues, low or no support or guidance on how to mentor students, a lack of awareness of the job market, misalignment with trainees' goals and desired career trajectories, and a mismatch of expectations regarding trainees' work–life balance.

Strategies to better support trainees include:

- Gathering data, studying training challenges, and engaging the community to find solutions
- Supporting trainees' personal and professional needs
- Establishing mentoring requirements for all faculty investigators
- Creating additional funding streams for more effective mentorship
    - Incentives to stay in research, such as larger stipends and loan repayment options
    - Additional training mechanisms
    - More funding to support transitions to the next career stage
    - Incentives for mentors to provide more focused and skillful mentorship
    - Training programs that introduce a wide variety of career paths

Sustained investment and systemic change at every level of the process will be required to bring academic research training in line with today's job market and trainee needs.

Clarifying Questions for Presenter

- There is a dramatic gap between the number of qualified researchers and the number of open faculty positions. Even trainees who want to stay in academic research struggle to find faculty jobs.
- Industry careers offer significantly higher income and many other benefits that academia cannot. Researchers who transition out of academia earlier consistently earn more money over the course of their careers and have more job security.

DISCUSSION

Strategies to Encourage Entry into the Oncology Workforce

- Students, especially those from disadvantaged backgrounds, often leave the oncology research pipeline before reaching a doctoral program. Providing postbaccalaureate training can help catch these individuals before they slip through the cracks and help prepare them to apply for PhD programs or medical school. The Florida-California Cancer Research, Education and Engagement (CaRE^2) Health Equity Center is a bicoastal cancer research and training center that works to support health equity by training researchers from underrepresented and minoritized backgrounds.

- Increased exposure to oncology careers should begin in middle and high school or earlier, fostering early engagement with STEM. AACR's Science Education and Career Advancement Committee offers programming beginning at the undergraduate level. A 2023 report by the National Science Foundation (NSF) found that early STEM exposure and engagement were lower among minoritized groups. AACR is developing a high school internship program; this model could be adopted elsewhere. Students from minoritized backgrounds are underrepresented at scientific meetings, which hinders their ability to form connections with peers and future mentors. AACR is also exploring ways to address this issue.
- Hands-on experience is an effective way of increasing interest in STEM careers. Internships for middle and high school students could provide exposure to fields and careers they find meaningful and interesting.
- Investing in career development infrastructure will support both entry and retention for the oncology workforce. Although the number of medical students from minoritized backgrounds is growing, this diversity is not reflected in the physician workforce, as students from underrepresented backgrounds are forced out of or leave training programs at a disproportionately high rate. The culture and infrastructure must be reformed in order to create a system that will support all trainees. Medical and surgical oncology are among the most competitive fellowships, which means that trainees will require additional support to succeed.
- Physicians and clinician-researchers are leaving clinical care in large numbers to work in industry, creating a dearth of clinical trialists. Increasing complexity in the healthcare system is causing increased burnout and drives professionals into other sectors; this is especially true for members of minoritized populations.
- Clinical trial coordinators are an essential but often-overlooked part of the cancer workforce, with the same concerns and needs (e.g., increased diversity and career development) as other roles. It is important to ensure that these professionals are included in workforce conversations. Without them, clinical trials cannot proceed.
- The University of New Mexico's (UNM's) undergraduate program includes a pathway for students interested in clinical trial coordination. The program provides secondary curriculum during the summers and engages students in clinical trial research.
- Students who are supported by training programs should have access to additional programs as they progress through their career. Linking existing or new programs into a clear pathway could help ensure that all students and trainees are getting the guidance and support they need. Examples of existing programs include the McNair Scholars Program, the Louis Stokes Alliances for Minority Participation program, the Kennedy-Lugar Youth Exchange and Study (YES) program, and the SEO Scholars program. Cancer centers should invest in programs like the Winn CDA to ensure that trainees are exposed not only to medical and surgical oncology but also to clinical trial design, implementation science, and community-oriented research.
- UNM's Comprehensive Cancer Center has a new program called Empowering Young Minds: Exploring Cancer and STEM Pathways, which leads free, biannual conferences for middle school students focused on STEM and health-related careers. The conferences include a variety of workshops on cancer and related topics in which UNM faculty and research scientists create hands-on, project-based learning environments for students to explore nutrition, anatomy and physiology, chemistry, neurology, and more. The conferences are held in rural communities around New Mexico and are partially funded by NCI grants. The conferences include a health

workforce fair. Bringing this programming to communities, rather than requiring students to travel, contributes to the program's success.

- At present, high standards for admission to medical and research training programs result in the exclusion of many populations. Rather than thinking of standards in terms of low or high, medical schools and academic medical centers should keep inclusion in the foreground and consider the qualities that make a good clinician.

Strategies for De-Risking Early Career Paths

- NCI offers K awards with protected time to clinician scientists and has a pilot program for early-career surgeon scientists.
- Grant-writing is a vital skill for researchers to learn in their initial postdoctoral phase. Interest in and skill at this task can serve as useful litmus tests for compatibility with this career path.
- Research institutions must do a better job of both diversifying and helping students find career paths that fulfill them.
- Morehouse School of Medicine is an HBCU focused on increasing the representation of minority health professionals. The school received a diversity and cancer research institutional development grant from the American Cancer Society, which allowed it to award 16 pilot grants to ESIs. The research funded by those awards created a foundation upon which the investigators could build with subsequent grants. The program also included two postdoctoral fellowships for translational scientists. The program also supports master's scholar awards and clinician scientist development grants. Institutions and funding organizations must invest in ESIs in order to set them up for future success with confidence, experience, self-efficacy, professional development, and preliminary data. This could be accomplished through public–private partnerships that expose ESIs to opportunities not only within academia but also in government and industry.
- Organizations and institutions, particularly those that are federally funded, should be required to measure and report on the quality of trainee and faculty experiences. Accountability is necessary to understand why so many researchers leave the field and to ensure that institutions are meeting their commitments to diversity and support for researchers.
- Mentorship is not a privilege or a luxury but an essential component of success for researchers. Opportunities to take leadership, work toward independence, and publish are directly tied to mentor involvement. Focusing on and supporting mentorship, especially for ESIs, is an important step. The Association of American Medical Colleges' Group on Research, Education, and Training (GREAT) focuses on mentorship and has developed compacts and guidance documents on the appropriate treatment of research trainees. These types of documents and guidance could not only be elevated and disseminated, but also financially supported and formalized. This would support both mentors and mentees.
- Mentors also need structured training and guidance that are suitable for their field and their mentees' career stage. Private-sector organizations have these formal programs, which help create and support clear career pathways and retention. Industry input can help inform any formalized mentor training efforts.

RESEARCH TRAINING NEEDS & MECHANISMS FOR BASIC & CLINICAL RESEARCHERS

SPRINGBOARD PRESENTATION

Oliver Bogler, PhD, Director, Center for Cancer Training, National Cancer Institute

Challenges

The representation of minority students and trainees declines throughout the educational pipeline; many students who choose STEM careers exit the highway before beginning their first jobs. Black, Hispanic, and American Indian/Alaska Native individuals represent 31% of the U.S. population but only about 5% of faculty in radiation and medical oncology. Initiatives to ensure successful recruitment and retention of individuals from underrepresented populations are urgently needed.

Over the past 20 years, the proportion of doctoral graduates leaving academia for industry has sharply increased. A 2023 *Nature* survey found that job satisfaction among postdoctoral researchers in academia has increased in the past few years but is still higher in industry. Factors affecting career choice are numerous:

- The private biomedical sector offers more job opportunities, higher compensation, and better benefits.
- Research in biotechnology and pharmaceuticals can be as exciting and meaningful as working in academia, particularly in clinical and translational areas.
- New pharmaceutical agents are available in the private sector, which attracts clinical investigators.
- High academic freedom is counterbalanced by low job security.
- Academic research leaders often convey the frustrations of their field to trainees but do not always share the rewards (e.g., freedom, joy, excitement).
- Other STEM-related sectors compete for talent.

Career sustainability is tenuous. NIH and other funders may support investigators through their first R01 but not beyond.

NCI's Current Investment and Structural Considerations for Funding Early-Career Research

The NCI Center for Cancer Training (CCT) and NCI are aligned with the mission of the National Cancer Plan, particularly the goal Optimize the Workforce. CCT has a broad portfolio of investments using multiple mechanisms across the career spectrum (e.g., T32 for predoctoral/postdoctoral trainees, K08 for clinical investigators). Approximately half of CCT's portfolio goes toward funding clinical investigators.

The vast majority (80%) of NCI-supported predoctoral and postdoctoral researchers are funded through research grants, rather than training or career development mechanisms. This means that there is no training plan, no formalized career development, and no oversight to monitor their progress. This structure creates confusion about roles and leaves students feeling unsupported in their careers and undervalued for their work.

Opportunities for Change

Reconceptualizing foundational research postdoctoral training as a two-stage process could help address some challenges. A new framework for research postdoctoral training was developed based on responses

to an RFI and other conversations. Under this framework, in the first phase (years 1–2), trainees could establish their projects, seek funding, and build skills such as grant writing, which will help the trainees and their mentors determine whether a career as an investigator is the right fit. Those who decide to leave the investigator track in favor of a staff scientist position could be supported by an NCI R50.

Those who wish to continue in their academic research careers would then enter the second phase of their postdoctoral training (years 3–5), which is more science focused but will help clarify their career path and provide additional training. NCI is working on increasing the number of grants available for this stage.

Additional strategies to support academia and government research efforts include:

- Closing gaps with competing sectors wherever possible, including through improved compensation and benefits
- Improving and clarifying career paths for cancer investigators
- Providing a continuity of funding and bridging gaps in the current path
- Highlighting the value and benefits of cancer research in academia and government

Clarifying Questions for Presenter

- The NCI K99/R00 award is intended to help postdoctoral scholars transition by supporting their development of a cancer research program that is competitive for subsequent funding. Dr. Bogler and his colleagues recently published a paper that concludes that the award positively supports training and retention and increases diversity in the cancer workforce. The vast majority of ESIs who receive K99s (approximately 95%) continue on in academic research.
- Certain disciplines, such as computational biology and data science, are in greater demand from industry. One approach to retaining these researchers in academia is creating special training programs with higher pay.
- The biomedical research workforce has a high proportion of international students, yet many award mechanisms are incompatible with student visas and require at least an H-1B. NCI is considering development of an award that is not visa-restricted. Another possible approach is removing the citizenship/permanent resident status requirement for K08 awards.
- NSF now requires a mentoring plan for all research grants that request funding to support graduate students. NCI may be considering a similar approach; however, in Dr. Bogler's conversations, he heard that basic scientists do not want more paperwork. He expressed skepticism that requiring a formalized plan would elicit better mentorship from those who are not currently providing it.
- Some pharmaceutical companies hold mentors and supervisors accountable for the career success and development of their trainees and employees. Dr. Bogler noted that each researcher has unique needs from a mentor relationship, and a standardized assessment that captures the number of grants or publications may overlook some important individual factors.

DISCUSSION

Strategies to Support Research Training

- With recent experience as mentees and as new investigators, graduate students can make excellent mentors for those who follow them. Mentoring is a way to give back and provides a sense of satisfaction.

- It is important for students and mentors to resonate with one another. There are pros and cons to both finding one's own mentor and having one assigned. A mixed approach could help maintain the benefits of each.
- Mentors and mentees should have clear alignment from the beginning on the student's interests, goals, and intended career path, as they may differ from those of their mentor. Individual Development Plans (IDPs) help set expectations from the beginning, although trainees may feel some hesitancy expressing interest in a career path that diverges from their mentor's, as some academic researchers will not want to train someone who plans to leave academia. Creating an environment in which trainees can be transparent about their interests will improve relationships and make mentoring experiences more beneficial for all involved. Mentoring is not just about the science, but about building skills such as interacting with colleagues. A good mentor is not only a subject matter expert but also will help build career competencies.
- Factors contributing to high rates of attrition among students from underrepresented backgrounds include a lack of mentors who share their background, feelings of isolation, imposter syndrome, and insufficient funding for research into health disparities and conditions that disproportionately affect underrepresented groups. Cultivating a culture of belonging and inclusiveness is crucial, as is improving representation among not only students but their mentors. Mentoring plans should be tailored and mentors trained to incorporate cultural sensitivity.
- Some investigators will be poor mentors regardless of how much guidance or training they receive. Institutions could consider revoking mentors' training privileges for problematic behavior, but this cannot catch every instance.
- NIH and other funding agencies could require better or more thorough training as part of a research grant.
- Despite NIH's and academic institutions' mandating the use of IDPs, little information exists regarding their actual use or their effectiveness and potential harms. Not all mentors understand what an IDP is or how to use it. More data on IDPs are needed before making recommendations to implement this tool more broadly.
- IDPs are living documents that should be revisited as a trainee progresses through training. Institutions' offices for pre- and postdoctoral students should help trainees develop their plans and connect them with resources. The plans should be agreed upon by trainees and their mentors at the very beginning. Disagreement about the plan can help surface a lack of alignment between the student and their intended mentor.
    - Mentoring could be reconceptualized as a team effort, rather than a mentor–mentee dyad. Offices within an institution could play a larger role in ensuring students are getting the support they need.
    - Trainees need a network of mentors, both formal and informal, to guide them at every stage. Encouraging trainees and showing them how to proactively develop this network will help protect them against falling through the cracks due to one bad relationship.
- Enforcement of mentor responsibilities is inconsistent. Mentors who are not part of formal training programs may not be held accountable for ensuring students are meeting their goals. Accountability and evaluation are needed for all mentors, particularly to ensure that mentees have a voice. Institutions must invest in high-quality mentorship and make it clear to investigators that this aspect of their work is important.

- The majority of ESIs are funded through non-career-development grants, which means that there are no training requirements for financial support. These trainees are often treated more like low-paid employees than students or mentees.
    - Shifts in criteria for funding mechanisms or in access to training grants could provide practical support and protected time for mentorship.
    - Many investigators are being tasked with mentorship, often of multiple trainees, regardless of their interest in mentoring. The additional workload is significant and often unsupported by an institution. Institutions are underutilizing diversity supplements, which could be used to support and improve mentoring.
- UNM has a new science, technology, engineering, and medicine grant program to support mentor networking, including through virtual summits. The program's mission is to raise capacity for STEAM education in areas that lack access.

PERSPECTIVES FOR THE RESEARCH WORKFORCE IN NON-ACADEMIC SETTINGS

SPRINGBOARD PRESENTATION

Quita Highsmith, MBA, Vice President and Chief Diversity Officer, Genentech

Ms. Highsmith presented on research workforce issues and opportunities in the industry sector. Progress toward diversity has been made in recent years, but there is still significant room for improvement. This is especially true in leadership roles, which have extremely low representation of women and minorities. Of the top 50 pharmaceutical companies, one-third have no women on their boards, and only 8% of seats are held by professionals from ethnic minority backgrounds.

A lack of diversity is detrimental for many reasons, even beyond equity, improving financial performance, innovation, agility, productivity, research impact, and clinical trial quality.

Many of the barriers to diversity in academic research settings also arise in industry. Women, members of racial and ethnic minority groups, and disabled people are pursuing STEM education in greater numbers than in the past, yet they remain underrepresented in the research workforce. Disabled representation in the STEM workforce has remained unchanged from a decade ago at 3%, and little research has been conducted regarding LGBTQ+ students.

Educational obstacles include limited access to K–12 STEM education in socioeconomically disadvantaged communities; a lack of representation among role models and mentors; gender, racial, and disability stereotypes; and a lack of accessibility for students with disabilities.

Recruitment barriers include assuming that there are no qualified candidates from underrepresented communities, unwillingness to bring recruitment to underrepresented communities, recruiting exclusively from elite schools, failure to adopt inclusive and accessible hiring and interviewing practices, and failure to leverage employee resource groups and professional associations.

Retention barriers include a lack of mentorship and sponsorship opportunities; bias in evaluation and promotion processes; failure to include underrepresented employees in leadership programs, rotations, and international assignments; a failure to update and implement diversity, equity, and inclusion (DEI) training; a lack of diversity among leadership; inaccessible workplaces; and the absence of a sense of inclusion.

To address these barriers, Genentech has created Futurelab. With an investment of $79 million and 75,000 employee volunteer hours, Futurelab supports STEM education in K–12 schools in San Francisco by getting students excited to learn about science, improving their college readiness, and inspiring them to pursue careers in STEM fields. Initiatives include school visits by scientists, K–12 mentoring, and shadow days for students at Genentech, as well as college scholarships for graduating seniors. A national expansion of the program has already reached more than 690,000 students, 62% of whom attend low-income schools.

Because first-generation college students often need access to additional funding, Genentech endowed a $14 million grant to San Francisco State University for STEM students from underrepresented backgrounds. The company supports a Funding the Future Physicians 2.0 program with The 15 White Coats, dedicated to helping underrepresented medical students go on to fellowships, and partnerships and fellowships with Howard University. In rural California, Genentech is collaborating with local community colleges to offer a bioscience technology program.

The company also prioritizes diversity among leadership, including hiring executives from underrepresented backgrounds and requiring vice presidents to have diversity action plans. Genentech has a DEI learning library, a Disability Inclusion Resource Hub, gender transition navigators, and 16 Diversity Network Association groups. All employees must undergo inclusive hiring training. The company has focused on advancing inclusive research and health equity since 2017.

In mid-2024, the FDA issued draft guidance to assist medical product sponsors in submitting Diversity Action Plans to support certain clinical studies. To date, pharmaceutical companies have submitted 76 plans; of those, nearly 30 are from Genentech.

Clarifying Questions for Presenter

- Genentech has increased the diversity of its postdoctoral trainees significantly in the last 4 years, as documented in the company's annual report. The organization has begun a new program to offer a computational biology rotation for employees, particularly those from underrepresented backgrounds, to help them build a skillset that will be essential as scientific tools continue to evolve.
- Participants in the Howard University fellowship spend 1 year at Genentech and another at the FDA, gaining both industry and regulatory experience. Genentech has hired a supervisor for postdoctoral programs to monitor success and ensure a welcoming environment. The company also has paid internships and maintains relationships with those who complete the program to encourage them to join the company in the future. There are multiple tracks for scientists, including bench science and leadership, and professionals can move between tracks throughout their careers.
- Futurelab could serve as a useful model for other organizations in the pharmaceutical sector. To date, at least 100 Futurelab students have become Genentech employees. Younger students have become interns. Genentech tracks the progress of participants in the San Francisco State program, but Futurelab students are too young to consent to being tracked. Ms. Highsmith cautioned against measuring the program's success in quantitative terms, especially because it is relatively young and working to remedy centuries-old inequities. Another marker of success is the proportion of employees who choose to volunteer their time to the program, both because they believe in the mission and because they see the difference it makes in students' lives.

DISCUSSION

Strategies to Support Research Careers Across All Sectors

- Rutgers has shared fellowships with the FDA, which have exposed trainees to multiple sectors and demystified pharmaceutical science careers. In its 40-year history, the program has supported more than 1,700 researchers, many of whom move on to industry jobs, while others return to academia and find faculty positions. There is an opportunity to expand these shared fellowships to bridge industry, academia, and regulatory agencies so that researchers can find the best fit for them.
- Joint graduate training programs between academia and industry could give trainees exposure to and experience in multiple sectors. The aim should be to help trainees reach their career goals, no matter where they want to work; unfortunately, many academic institutions are reluctant to give this freedom to their trainees, as students are an inexpensive labor force. To incentivize this collaboration and cross-pollination and to improve training, NIH could create additional training mechanisms.
- Because the biomedical field evolves rapidly, institutions should encourage grant applications related to career development in emerging and fast-growing fields such as computational biology, AI, and data science.
- Life sciences companies are establishing formal partnerships with academic institutions in the translational space. As those contracts and partnerships evolve, it will be important to ensure that formalized career development and training are baked into agreements. Incorporating training best practices in these collaborations would set a new standard and encourage a bidirectional flow of talent. There is some distrust of industry partners on the part of academic institutions, which invest time and money in training ESIs only to lose them to industry; however, industry partners largely see the benefit in enriching all sectors of the biomedical workforce, which includes continuing to support academic research. Creating cross-sector opportunities will help incubate new ideas and motivate younger researchers. The Health Research Association grants funding to researchers in targeted therapeutic areas. The organization is developing best practices for what benefits these kinds of awards should provide, including childcare. There is a strong appetite for this kind of engagement. The Foundation for NIH is considering organizing a meeting on this topic to bring institutions, life science companies, and other leaders in this space together to develop best practices and identify opportunities for scaling up this model.
- Research and development budgets are shrinking within the pharmaceutical industry, driving a renewed investment in biology. Academic research institutions have expertise in basic science. One possible approach would be a collaboration in which academic partners identify a drug target, then pass off the drug development to their pharmaceutical partners. Some partnerships like this are already up and running, with collaborators including Amgen, the University of Southern California, Pfizer, Bayer, and the Broad Institute. These types of partnerships also represent an opportunity to improve diversity and inclusion. Experts could draft a white paper that envisions the ideal form for these partnerships, including fellowships or other support for individuals from underrepresented backgrounds.
    - NCI and NIH more broadly also train and support a diverse pool of investigators and should be included in partnerships. Institute leadership can connect interested trainees with industry partners for internships or other cross-sector exchange.

    - Rural institutions, MSIs, and HBCUs are already connected to their communities and represent important players that should be at the forefront of these kinds of partnerships.

- The pharmaceutical sector relies on well-trained scientists to design and run clinical trials. Improving diversity and inclusion in academia will therefore feed a more diverse pipeline of clinical trialists, which in turn will improve recruitment of a more diverse participant body.
- Diversity in clinical trials benefits patients, academia, funding agencies, and industry. Clinical trials should be developed and run in partnership with the communities in which they are based in order to build trust, which has been damaged by centuries of harm.
    - Faith-based organizations and other community leaders have significant influence and can help drive research participation by emphasizing the benefits and allaying distrust. These stakeholders should be formally included in any research partnerships, as they have crucial and unique insights into their communities' needs, concerns, and obstacles to participation (e.g., transportation or childcare). Federally qualified health centers can also contribute in this way.
    - Community-based researchers can help engage trusted community members who can drive participation. This important role should be developed and supported as a distinct career path for trainees.

COLLABORATIVE CROSS-SECTOR OPPORTUNITIES FOR IMPROVING ONCOLOGY RESEARCH TRAINING

The Panel led a brainstorming session to identify opportunities for collaboration across research sectors.

- Patient navigators are a critical component of cancer care and research, yet funding for training, compensation, and other support for these professionals is limited. Cross-sector investments in patient navigators will have a ripple effect, supporting research by connecting patients with clinical trials and outcomes through helping patients access clinical care.
- Public–private partnerships and cross-sector collaborations benefit all parties involved, as training researchers in multiple arenas makes them stronger investigators, regardless of where they eventually land.
- Each person who interacts with a patient should understand not only the physiological aspects of cancer and its treatment but also the practical experience. Educating healthcare professionals on how to be good patients themselves could improve bedside manner, trust, and compliance.
- Cross-sector partnerships should keep the end goal—developing therapeutics—in mind, as this common goal will help align values and encourage both innovation and collaboration. Beginning with this mission can help inform collaborative program design and spark solutions.
- When completing his graduate studies in Europe, Dr. Davani was supported by a pharmaceutical company to conduct research in an academic laboratory. During this time, he developed numerous animal models in which to test a small molecule provided by the company. The academic laboratory retained rights to the publications and intellectual property that were generated based on this work. Upon completing his graduate degree, Dr. Davani continued studies on the lead compound at the pharmaceutical company. The company eventually sold the lead compound to another company. This model is well established in Sweden.

- Although today's meeting represents an important start, future convenings should include a large contingent of industry leaders.
- The industry-funded Winn CDA is an excellent model that fosters both career and community development. Additional industry investment would strengthen the program and enable expansion into other cancer workforce roles, as well as scaling up. Bolstering the workforce will require support of roles beyond investigators. Study coordinators, data managers, CHWs, and patient navigators are all crucial parts of cancer research, and their career development deserves—and needs—greater investment.
    - Part of the program's success comes from the fact that it is truly collaborative. The mission-driven focus unites and galvanizes partners and participants and encourages mutual trust.
- As this meeting has demonstrated, many organizations and institutions have their own initiatives, all working independently. Working together to identify standards and strategies that can be implemented across the board will be a more efficient approach.
- Barriers to diversity are myriad and often subtle. Application fees, even those that seem small, can prevent students from disadvantaged backgrounds from applying.
- Over the last few decades, the role of pharmacists in industry has expanded and become more central. Pharmacists with advanced degrees represent an untapped resource for research across all sectors.
- Clinician scientists need protected time for clinical trials, which could be supported by industry.
- A partnership between industry and MSIs could be very beneficial, as could collaboration with community colleges.
- Awareness about non-investigator cancer careers such as genetic counseling is low, particularly among marginalized communities.
- Conceptualizing the research workforce as part of the community is effective and important. Genentech's Advancing Inclusive Research Site Alliance is a partnership between the company and research sites across the country that aims to improve diversity among clinical trial participants and dispel myths about diversity's negative effects on research power. Improving diversity among research study staff is leading to increased trial participation and diversity among participants. In addition to improved trial accrual, benefits to Genentech include quantitative evidence that the company is working to improve inclusion and equity. These data will be included in the Diversity Action Plan that the company submits to the FDA. The success of this program and others demonstrates the business case for investment in communities and diversity.
- Representation is essential at every level of cancer research. The investigators designing trials must understand the communities they intend to recruit. This is best accomplished by nurturing and supporting a diverse research workforce. Currently, the small number of trainees and faculty who come from underrepresented backgrounds are called upon as uncredited and unpaid consultants, which increases their burden and increases the risk of attrition.

PUBLIC COMMENT

The Panel opened the floor to comments from members of the public.

- A member of the public asked participants to suggest strategies for continuing to increase workforce diversity within the strictures of recent state-level and Supreme Court decisions.
    - One approach is to emphasize lived experience and surmounting adversity in the recruiting and hiring process rather than explicitly focusing on race or ethnicity. This strategy traces the importance of diversity to its core and emphasizes the benefits that a diverse workforce can bring.
    - Best practices in recruiting recommend a focus on competency, rather than attributes or background. Important competencies such as cultural dexterity and community engagement are often stronger in people from underrepresented backgrounds. Valuing and prioritizing these strengths can help identify candidates who might otherwise be overlooked.
    - Organizations should widen their networks and diversify the range of spaces in which they are posting or advertising jobs. This will naturally increase and diversify the pool of applicants, simultaneously attracting the best candidates and improving inclusion. For example, the Rutgers pharmacy school has begun a partnership with the highly diverse Student National Pharmaceutical Association.
- The Ohio State University has developed an undergraduate certification in clinical research to prepare students to enter the research workforce immediately after graduation. This serves as a direct pipeline for the university.
- Emotional and cultural awareness should be incorporated into mentor training and IDPs.
- There should be a greater focus on developing cancer research careers beyond doctoral roles. Patient-facing clinic staff often leave academic research for industry, which offers a clearer and better-supported pipeline for career development and training.

FINAL COMMENTS

The Panel asked participants to share their parting thoughts and recommendations to the President.

- Cancer research professionals need to feel fulfilled for the duration of their careers in order to feel successful. They need enough compensation to feel rewarded, as well as development opportunities, work–life balance, and to feel like they are making a difference. It is important to remove barriers to entry, increase awareness of cancer career paths, and increase training support and quality mentorship.
- Creating and supporting a diverse workforce requires not only mentorship but sponsorship to help trainees step up, occupy space in the field, and become leaders. Efforts to increase diversity will work only if they encompass all career stages, as increased representation among role models, mentors, and leadership is an essential factor for trainee success. Researchers from underrepresented backgrounds must be able to connect with members of their own community, who can help foster growth and provide insights that outsiders would not have.
- Workforce issues reach across all of oncology. Diversity is important as it pertains not only to trainee or researcher backgrounds but also to career roles and paths, all of which are equally important and deserve the same level of support. Community health educators, patient navigators, and clinical trial coordinators need to see clear career paths that demonstrate an investment in their extremely valuable work and experience.

- Keeping patients and their outcomes in the foreground will help ensure that workforce efforts stay true to the ultimate goal. Patient- and outcome-centered approaches remove noise and distraction and drive effective and equitable change.
- Success for the cancer research workforce depends on creating and supporting early and multiple entrance points to the career highway, particularly for students from underrepresented backgrounds.
    - Postbaccalaureate programs that provide stipends to students could help advance this goal, as could paid internships for high school students.
    - Moving away from the apprenticeship model and providing enough financial support for students and professionals from underrepresented backgrounds would help increase capacity.
    - Early exposure to STEM education, including learning about health disparities, will help impassion young students to turn toward cancer research careers to make a difference in their communities and the world. This is especially urgent in rural communities and for students from underrepresented backgrounds. Science fairs, toolkits for classrooms, classroom visits by scientists, and other outreach activities help raise awareness and spark excitement, and skills such as essay-writing, résumé development, and public speaking level the playing field for first-generation students.
    - Exposing K–12 students to STEM also exposes their families and may inspire new careers for those who had previously been unaware of or unable to access these paths.
    - These investments will take decades to bear fruit, but they are extremely important.
- Key to the success of public–private partnerships is mission: keeping in mind that the work is for the good of society. The rising tide of these collaborations will lift all boats.
- The structure of scientific institutions has become extractive, relying on trainees for inexpensive labor without providing them the support they need to thrive. A significant cultural and structural shift is needed, or the workforce will continue to founder. Trainees need higher quality mentoring and practical support, and clinician investigators need protected time to conduct research.
- Each segment of the workforce has its own issues and solutions; it is important that strategies be tailored and that solutions to one problem do not create new issues downstream.
- Change must start "at home," so to speak, within individual organizations, as well as more broadly.
- Institutions focused on health equity have unique connections to their communities and should be welcomed and valued as equal partners in any workforce efforts.
- Rebuilding trust is a major consideration, not only between marginalized communities and research but also across academia and industry. Cross-pollination efforts in which all parties are transparent will help restore good faith and advance research and discoveries for all.
- Increasing diversity among the student body has not led to increased diversity among faculty or leadership. Institutions must provide clear career paths and help prevent underrepresented students from being ejected from the field.

- The cancer research workforce is a vital component of cancer care and improving outcomes. Steady and increasing support from funding bodies, including NIH, is required. NIH should consider collaborating with the National Health Council. Finding new and innovative ways to support the workforce will require rethinking training models and award mechanisms, supporting future scientists with STEM education, and forging collaborations across sectors.

CLOSING REMARKS

Dr. Jaffee thanked the springboard presenters and all participants for their input and expertise. She emphasized that the discussions at the meeting were a starting point. The Panel will continue to solicit input and engage with the cancer community on this subject. Participants can send additional information to the Panel by email using PresCancerPanel@mail.nih.gov; all information received by September 30 would be considered for inclusion in the Panel's report to the President. Additional written testimony and comments can be submitted at any time to the President's Cancer Panel via email or the Panel website (https://prescancerpanel.cancer.gov).

CERTIFICATION OF MEETING SUMMARY

I certify that this summary of the President's Cancer Panel meeting, Developing and Retaining a Robust and Diverse Cancer Workforce: Challenges and Opportunities Across the National Cancer Program, held on September 12 and 13, 2024, is accurate and complete.

Certified by: _____ Date: November 6, 2024

Elizabeth Jaffee, MD, FAACR, FAACP, FAAAS, FAIO
Chair
President's Cancer Panel