

Addressing the Physician-Scientist leaky pipeline: Early Career Physician Scientist Initiative & Insights on Fostering Physician-Scientists at Yale School of Medicine from Dean Robert Alpern, MD

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The United States is the world's leader in biomedical research due in large part to the contributions of physician-scientists (1-2) Physician-scientists (PS) account for ~1.5% of the nation's entire physician workforce, down from 4.5% in the 1980s (3); however, they are invaluable to biomedical research efforts (4-6). Because of their dual training, PSs play a critical role in identifying clinical problems and translating research findings into medical advances. It is through their efforts in biomedical research that certain diseases have been eliminated and medical procedures and therapies that save lives have been developed, leading to increased life span and quality of life, benefitting people around the world.

More novel technologies today including new imaging modalities, bioinformatics tools, electronic medical records, shotgun sequencing, artificial intelligence and CRISPR/gene editing/RNA editing can enable even further advances in the understanding of human disease and novel ways to treat and prevent them (7-10). Multi-omics data and wearable data in addition to the above, can usher in a precision medicine era that physician-scientists are poised to move forward in efforts to improve human health (11-12). However, their existence is endangered and has been on the decline over the past several decades (5, 6, 13). One of the most vulnerable cohorts are the early career physician-scientists. This group is composed of residents, fellows, and junior faculty who are faced with challenges, such as pressures for clinical productivity, malpractice, starting a lab/research portfolio, a challenging funding environment, and difficulties negotiating protected research time due in part to misaligned economic incentives from the clinical world (14-15).

To address this, the American Physician Scientists Association (APSA) developed the resident/fellow/junior faculty section in April 2019. The purpose of this section was to create a community for physician-scientists at these vulnerable training stages and to support them and address the obstacles they are facing. We are developing resources, events with topics geared toward early career physician-scientists (including contract/salary negotiation, grant writing, and conflict negotiation), and conducting research to assess factors contributing to the leaky pipeline of this cohort in collaboration with organizational stakeholders. We held a think tank session at the 2019 ASCI/AAP/APSA meeting in Chicago, which included PSTP/MSTP directors, the president of the Lasker Foundation, Clare Pomeroy, Physician in Chief at Rockefeller University, Barry Collier, President of the National Academy of Medicine, Victor Dzau, Presidents of ASCI and AAP, leadership from the Burroughs Wellcome Fund, and other academic leaders from around the country to discuss the current state of affairs of the leaky pipeline with insights featured here that have helped guide our initiatives: <https://twitter.com/jennkwanMDPhD/status/1114595813269954562?s=19>.



(Participants in APSA/ASCI/AAP session April 2019)

One of the data-driven initiatives of this section was to develop a survey that would identify good institutional/departmental practices that would support early career physician-scientists with the goal of sharing these practices. It was initially called the “research RVU” initiative since we want to identify ways to support physician-scientist research activities akin to clinical RVUs. However, since we broadened the scope of practices assessed, we renamed it the “Early Career Physician Scientists” initiative, for which an IRB approved survey has been developed to assess institutional and departmental practices that contribute to the success of early career physician-scientists. With the help of the AAMC GREAT group chairs, Barbara Kazmierczak MD, PhD, MSTP director at Yale University, and José E. Cavazos, MD, PhD, Assistant Dean & Director of the South Texas MSTP, the survey is currently underway. Further, because the National Academy of Medicine and others, like the Physician-Scientist Support Foundation, are looking at ways to best train and support physician-scientists, this survey can help fill in some of these critical data gaps.

We are grateful to all the academic and organizational leaders who have contributed to this survey and would like to highlight invaluable insights that shaped this survey from our discussions with Dr. Robert Alpern at Yale University School of Medicine (SOM), a physician-scientist and mentor, who served as Dean of the SOM from 2004 to early 2020. Since 2004, under Dean Alpern, the percentage of women faculty at the Yale SOM increased from 29.5% to 39.4%. Dean Alpern also sought to increase salary equity by instituting an in-depth review of individual faculty members’ compensation, a process that led to greater salary equity and significant salary increases for numerous faculty members. The number of tenure-track faculty grew from 980 in 2004 to more than 1,600.

During his tenure, he oversaw and grew the SOM’s financial resources, increasing the school’s endowment from \$1.1 billion to \$2.9 billion and elevated its NIH research funding standing from 8th nationally to 6th.

American Physician Scientists Association, April 2020

Clinical trial revenues increased from \$6 million to more than \$40 million, and clinical practice revenues from \$280 million to more than \$1 billion.

Because of his efforts in supporting early career physician- scientists and diversifying the school of medicine, we wanted to hear from Dean Alpern about what he thinks are his greatest accomplishments as dean. We thank him for his support of our survey and we look forward to sharing these results with the academic community.

Q&A with Dean Robert Alpern MD

Q: Which Yale policies/practices (other factors) do you think have enabled the university to be both a successful top NIH AND top total K to total NIH funded institution?



A: We focus on scientific excellence. Yale recruits the best faculty and then provides the resources and environment that will help them succeed.

Including hiring surgeon scientists, such as the head of surgery, who has worked toward a way to equalize the salary of full time clinical surgeons and surgeon-scientists

Q: What university resources are available to postdoctoral/clinical fellows trying to get their first grant?

A: The most important resource is outstanding mentorship. We recruit faculty who are not only great scientists, but are also committed to mentorship of their trainees. When we recruit senior faculty or promote faculty to tenure, we evaluate their training records to see if they have supported their trainees and if their trainees have

gone on to successful careers. We also have an institutional office to support postdoctoral fellows, but this needs to be expanded in the scope of services it provides.

As a trainee at Yale, I can vouch for this, having excellent physician scientist role models and mentors who look out for our careers and take extra steps to be sponsors

Q: As a dean, what do you see as the top 3 major challenges for physician-scientist junior faculty to advance in their research careers?

A: The major challenge is to excel in two worlds: those of research and clinical medicine. The strength of a physician-scientist is not only that they train in both clinical and scientific domains, but that they continue to work in both domains. This creates an important obstacle. They must be among the best clinicians and they must be among the best researchers, in both cases comparing themselves to faculty who devote their entire effort to either clinical medicine or research. I can't think of other challenges that are unique to physician-scientists.

Q: What do you think are your biggest accomplishments as Yale SOM dean?

He made improvements on multiple fronts as noted below:

A: **Education**

- Developed and implemented a new curriculum
- Created a Teaching and Learning Center to improve the quality of faculty teaching and assessment
- Built new classrooms that support newer approaches to education
- Lowered the debt that graduating students should have to a maximum of \$60,000.
- **Research**
 - Recruited many outstanding scientists
 - Built and renovated research space to support expansion of our research
 - Expanded core support for research
 - Formed centers focused on stem cell biology and neurodegeneration
 - Formed and expanded the Yale Center for Clinical Investigation, which served as a home for clinical research and our NIH CTSA grant
 - Transformed the cancer center into a vibrant research and clinical entity
- **Clinical**
 - Established the clinical mission as one that stands equal to our other missions in importance
 - Expanded the size of the clinical faculty three-fold
 - Expanded the management of the clinical practice
- **Culture and climate**
 - Increased the gender and racial/ethnic diversity of our faculty and our leadership
 - Started a number of initiatives that will address clinician wellbeing, faculty engagement, leadership, and bullying and sexual harassment
- **Finances**
 - Transformed the medical school to one that has sustained healthy finances.

Q: How do you foresee physician-scientists fitting into the evolving healthcare enterprise and their roles in translating scientific discoveries to benefit human health/outcomes?

A: I believe physician-scientists will fulfill an important role by addressing clinically relevant questions with the best science. Physician-scientists will continue to do basic research, but there will likely be an increase in the numbers who do more clinical research.

Q: What factors were helpful for you as a physician-scientist coming up (mentors, institution, etc.), and do you think that the landscape has changed (ie. misalignment of incentives, pressure to do more clinical duties, etc.)?

A: I chose my mentors well and thus benefited greatly from their advice and guidance. I was exposed to many great physician-scientists and was able to see what they did well and not so well, and used the former to guide my actions. I did train at some of the best institutions, but it was the faculty and students there that were key. It is now more difficult to be a physician-scientist because the demands to achieve excellence in clinical medicine have increased, while it has become more difficult to obtain research grants.

Dean Nancy J Brown, a physician-scientist who has elucidated insights on targeting the renin-angiotensin pathway, is the first female dean in the history of Yale SOM. She took over the reins from Dean Alpern a few weeks ago and has a track record and deep knowledge of the physician-scientist workforce (16-17), working to increase early career physician-scientist success at Vanderbilt with a high K to R conversion. At Yale, she now aims to continue building on the achievements of Dean Alpern to strengthen Yale's tradition of scholarship and physician-scientist development. We appreciate their support of national initiatives that affect physician-scientists around the country and world.



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