



Characterizing the Availability and Impact of Career-Planning Resources for Internal Medicine Residents

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Scholarly Report submitted in partial fulfillment of the MD Degree at Harvard Medical School

Date: 15 April 2018

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Scholarly Report Title: Characterizing the Availability and Impact of Career-Planning Resources for Internal Medicine Residents

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Horatio R. Thomas: HT led the development of the surveys including leading the working groups discussions, item development, and pilot testing. He also conducted and transcribed all phone interviews. At the time of the study, he is a fourth-year medical student, completing his medical school training between 2013 and 2018 and a masters in medical education. He knew three of the program directors included in this study prior to this research but did not know the other five program directors. He may have interacted with small subset of the resident participants during his clinical training, but he was not known to the resident participants during the time of data collection. He deliberately did not partake in clinical activities at participating institutions during the time of data collection. Because he was applying to residency during the study period, he was familiar with many of the resources advertised by residency programs. As a researcher, he made conscious efforts to note where he had learned about certain resources and include only the information generated from the survey or the interviews in this study. He consciously avoided making assumptions about the perceived priorities of program directors or experiences of residents based on experiences outside of this context.

Characterizing the Availability and Impact of Career-Planning Resources for Internal Medicine Residents

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A Thesis Submitted to the Faculty of

The Harvard Medical School

in Partial Fulfillment of the Requirements

for the Degree of Master of Medical Sciences in Medical Education

Harvard University

Boston, Massachusetts.

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Thesis Mentor: Debra Weinstein, MD

Author: Horatio R. Thomas

Abstract

Title: Characterizing the Availability and Impact of Career-Planning Resources for Internal Medicine Residents

Purpose: Although many resources help residents develop post-residency, we hypothesize current resources are variably useful and that there is some degree of mismatch between the resources and support provided by residency programs and those desired by residents.

Method: This is a mixed-methods study that uses a sequential explanatory study design that consists of a cross sectional survey of postgraduate year three (PGY-3) internal medicine senior residents and internal medicine program directors followed by semi-structured interviews with program directors.

Results: Eight internal medicine residencies participated. Of the 201 PGY-3 residents who completed the survey, 42% (n=85) changed their plans. At the end of residency, significantly fewer residents planned to pursue a fellowship immediately afterward (74% v.59%, $p < 0.01$) and significantly more residents intended to pursue hospitalist medicine immediately after residency (10% v 29%, $p < 0.01$). Residents disagreed with their program directors about the availability and value of mentorship and research supports and there were notable differences in the perception of resources based on gender and interest in academic medicine. Female residents were less likely to received guidance on apply to academic (54% v. 71%, $p=0.01$) and non- academic (32% v. 47%, $p=0.04$) practice-based positions and were less aware of research funds (38% v. 58%, $p < 0.01$) despite equally valuing mentorship opportunity and research supports. Residents strongly interested in a career in academic medicine were more likely to pursue hospitalist medicine as a bridge to fellowship, to identify career mentors, strongly value mentorship experiences and research supports. While program directors aid in the development of these plans, they face challenges with 1.) negotiating competing

demands amongst stakeholders, 2.) developing resources deliberately, 3.) maximizing the value of limited resources, and 4.) cultivating social capital.

Conclusions: Residents actively change their plans during training. Training programs facilitated post-residency plan development by providing residents with clinical, mentorship, and paraclinical resources. Notable disagreement between residents and program directors and differences in the perception of resources based on gender and interest in academic medicine suggests that future initiatives should rigorously evaluate the efficacy of developed resources with explicit attention to difference in outcome based on residents' identities and/or interests.

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Introduction

Internal medicine residency is the post-M.D. educational pathway for those pursuing general internal medicine and a variety of subspecialties of medicine. There are approximately 26,000 internal medicine residents in training in the U.S. each year.¹ As residents approach the end of their three-year training, they face a number of career decisions. In addition to choosing whether to pursue sub-specialty training, residents may select practice-based positions including hospital-based, outpatient, urban, rural, academic, and non-academic positions. Other parameters residents may consider include medical practices with a variety of organizational structures (e.g. single specialty or mixed specialty solo practice or group practice) and payment models (e.g. fee-for-service, pay-for performance, episode-based and bundled payments, and shared savings).^{2,3} Increasingly, residents also pursue opportunities outside of clinical medicine including private sector employment and nonprofit work in combination with or in lieu of clinical practice. Given the wide array of career paths open to residents, career planning is an essential activity during residency training, and career planning resources may have an important impact on individual residents and the healthcare system. In addition, some career planning activities can help to develop skills in self-assessment and may also contribute to professional identity formation.⁴

While internal medicine residents often begin their residency with ideas about what they might pursue afterward, many change their plans.⁵ A single-institution study of US internal medicine residents in 1994-1995 found that more than 50% of residents changed their career plans during residency while a cohort study of residents taking the Internal Medicine In-Training Exam (IM-ITE) during 2002-2004 found that 62% of residents changed their plans.^{5,6} Residents who changed their career plans during residency selected a diverse array of paths. A follow-up national cohort study using the IM-ITE survey to track residents' interest in general internal medicine found that 45% of residents who reported an interest in general internal medicine in their first year of training changed their career plans by their third year of training. Interestingly, 62% of the residents who were pursuing general internal medicine in their third year of training had changed from another career plan, with most individuals previously intending to

pursue subspecialty training. Therefore, residents' interests have bidirectional fluidity between generalized and specialized career aspirations.⁵

Previous attempts to understand the factors that influence residents' career plans across a variety of programs and specialties have explored the role of resident-specific characteristics, priorities, and future desires. Important attributes of residents that have been associated with certain career trajectories include residents' gender and hometown. In residents pursuing internal medicine or pediatrics, studies have shown that female residents were more likely to voice interest in primary care than their male colleagues both early and late in training.⁵⁻⁷ The location of residents' upbringing has also been shown to play a role. For example, studies have found that residents from rural areas are more likely to return to rural areas after completing training.^{8,9} Furthermore, internal medicine and pediatrics residents who graduated from American medical schools are more likely to pursue careers in primary care than those who graduated from international medical schools.^{5,7} The difference in preference for primary care among American and international medical school graduates was most pronounced among those completing a primary care track during residency.

Residents also choose different paths based on personal priorities including preferences about location of practice, lifestyle, financial outlook, and family life.¹⁰⁻¹² For example, Garibaldi RA *et al.* found that residents interested in outpatient general internal medicine, compared to those interested in pursuing subspecialties, more frequently cited additional time with family (60% v 39%) and for "nonwork" activities (52% v 33%) as reasons for choosing their respective career paths. Residents pursuing outpatient general medicine less frequently listed higher income as reasons for choosing their career compared to those interested in subspecialties (7% v 27%).¹³ Residents' preferences also differed based on the subspecialty they intended to pursue. For example, prioritizing more time with family was higher among those pursuing endocrinology (81%) and geriatrics (65%) than cardiology (6%) and pulmonology (17%). A qualitative study explored this decision-making process further in general medicine residents in Canada and found that practice environment (e.g. lifestyle, job prospects, and income), concern about the specialty's prestige, and the duration of fellowship training were key factors governing both the choice to pursue a subspecialty and the

selection of which subspecialty to pursue.¹¹ Similarly, a cross-sectional survey of residents applying to pulmonary critical care fellowship showed current fellows' satisfaction with their lives, residents' individual geographic preferences, and spousal employment opportunities were among top factors that influenced residents' selection of a program.¹⁴

Other studies have shown how residents' perceptions about the nature of their future practice affect their career plan. Critical factors previously explored include attributes of clinical practice (e.g. long-term relationship with patients and breadth of practice area), subspecialty training environment (e.g. personality of field, access to procedures), and the interests in non-clinical professional endeavors (e.g. science and technology, public health, and public policy) in developing career plans.^{11,13} For example, Garibaldi *et al.* found that residents interested in outpatient general internal medicine and hospitalist medicine cited a broad practice area as a reason for their specialty choice more often than residents interested in subspecialties (73%, 65%, and 27% respectively). While resident-specific factors undoubtedly shape their preferences for their future careers, exposure to various experiences and resources during residency may also play a critical role.¹⁵

The Accreditation Council for Graduate Medical Education (ACGME) includes career planning advising among its requirements for internal medicine program directors. Specifically, the ACGME requires institutionally-based core faculty "to provide advising for residents in the areas of educational goal-setting, career planning, patient care, and scholarship."¹⁶ In addition, the ACGME and other professional organizations, including the American Medical Association (AMA), American College of Physicians (ACP), and local medical societies, offer internal medicine residents guidance on developing their post-residency plans through structured online materials, information sessions at scheduled meetings, and networking events.^{16,17} These materials provide guidance on topics from resume, CV, and cover letter development to understanding different payment structures.^{2,17}

Training programs too have developed a host of resources including scholarly and clinical tracks and mentorship programs that nurture residents' academic and community health interests alongside their clinical training.¹⁵ In recognition of the value

of clinical exposure to career planning, program directors across the country served on a taskforce of the Alliance of Academic Internal Medicine that streamlined the subspecialty application process and moved the match process to later in residency.^{18,19} Some programs have also expanded the range of clinical elective experiences offered to residents to allow more time to explore a wider variety of patient populations and clinical settings (e.g. urban and rural community practices, private practices, international practices).^{20,21} Global health and community health experiences, in particular, have gained traction over the past few decades.²²⁻²⁴ Some of these initiatives have affected residents' plans. For example, increasing resident exposure to rural environments during training significantly improves recruitment of residents to practice in rural areas.^{8,9,25-28} A study of urology residents showed that providing one year of protected research for residents was associated with a higher h-index and increased pursuit of fellowship training compared to residents who completed residency with less than one year of research.²⁹ In spite of these successes and calls to provide additional opportunities to residents, little is known about the spectrum and flexibility of electives offered to residents and the impact of these programs on their career development process.⁴

Growing financial constraints necessitate that the resources provided to residents appropriately address their needs and provide value. Currently, there is a paucity of data characterizing the various forms of resources provided to internal medicine residents and the perceived value of these resources among residents. Our study aims to characterize the variety of resources provided by a sample of internal medicine residency programs and their sponsoring institutions and to clarify the perceived value of various resources to residents in developing their post-residency plans. Institutions have developed unique but similar programs for supporting residents in developing their post-residency plans. Although many of these resources may help residents in their career planning, we hypothesize that they are variably useful and that there is some degree of mismatch between the resources and support provided by residency programs and those desired by residents. Disagreement about the perceived availability and usefulness of resources may exist between residents and program directors. Our study tested this hypothesis by investigating which resources residents and program

directors perceive as available, as useful, and as needed but unavailable. It will address where the two stakeholders' perspectives do or do not align. Specifically, we

1. Characterized the different forms of institutional support and resources provided to residents from the perspective of residents and program directors and identified differences in perception of availability of resources.
2. Evaluated the perceived usefulness of the institutional support and resources currently provided by internal medicine residencies from the perspectives of program directors and residents and uncovered differences in the perceived values of programs.
3. Explored the gap between existing institutional resources for post-residency planning and those desired by residents and program directors.
4. Characterized the barriers to providing additional resources for post-residency planning to residents from the perspective of program directors.

Methods

In this mixed-methods study, the researchers use a sequential explanatory study design that consists of a cross sectional survey of internal medicine senior residents and internal medicine program directors followed by semi-structured interviews with program directors.

Researchers

The primary research team consisted of four individuals: HT, DW, MJ, GG. Reflexivity was maintained throughout all phases of this study by noting, discussing, reflecting on, and challenging the assumptions of each researcher.³⁰

HT led the development of the surveys including leading the working groups discussions, item development, and pilot testing. He also conducted and transcribed all phone interviews. At the time of the study, he is a fourth-year medical student, completing his medical school training between 2013 and 2018 and a masters in medical education. He knew three of the program directors included in this study prior to this research but did not know the other five program directors. He may have interacted with small subset of the resident participants during his clinical training, but he was not known to the resident participants during the time of data collection. He deliberately did not partake in clinical activities at participating institutions during the time of data collection. Because he was applying to residency during the study period, he was familiar with many of the resources advertised by residency programs. As a researcher, he made conscious efforts to note where he had learned about certain resources and include only the information generated from the survey or the interviews in this study. He consciously avoided making assumptions about the perceived priorities of program directors or experiences of residents based on experiences outside of this context.

DW played a critical role in mentoring each step of the project, including study question development and revision of survey items, recruitment of participants, discussion and interpretation of the results, and the composition of this manuscript. At the time of this study, she is the Vice President for Graduate Medical Education (GME) at Partners HealthCare. She completed internal medicine and gastroenterology training at MGH (1984-1990), served as the Chief Resident (1989), and was the Program

Director in internal medicine (1990-1994) there. Thus, she utilized experience as a trainee, program director and institutional GME leader in shaping survey questions that would be relevant and understandable to residents and program directors. Her knowledge and opinions related to internal medicine training and career planning were used in identifying questions for investigation and formulating hypotheses. DW works with two of the program directors that participated in this study through her GME role and knows two others casually (one as a former medicine Program Director colleague, one as a former trainee). She did not participate in conducting interviews or developing themes from the Program Director interviews.

MJ is fourth year medical student completing a masters in medical education and GG is third year medical student with prior experience in qualitative analysis and observational field work. Neither parties were known to the program directors. Both parties participated in the analysis of deidentified interviews. Both MJ and GG made stated their assumptions explicitly throughout the interview analysis process.

Participants

HT and DW invited directors of thirty-four internal medicine residency programs in the US northeast, mid-Atlantic, and south located in urban, non-urban, academic, and community settings to participate in this study. We included all eight internal medicine residency programs whose program directors consented to completing all components of the study (Table 1). In addition, we decided to focus on residents completing their final year of training (i.e. post graduate year three, PGY-3) because they were more likely to have developed their post-residency plans and to have experienced the full range of resources available at their training institution related to post-residency plan development.

Instruments

Survey Development:

The survey for residents and program directors captures their perceptions of the availability of opportunities for individualizing their education, for mentorship, and for pursuing academic and community interests at their respective residency programs toward the goal of developing post-residency plans. Since the researcher found no surveys that sufficiently ascertained residents' and program directors' perceptions of the

post-residency planning process and available resources, he developed new surveys to address this topic (appendix 1 and 2.)^{31,32}

HT developed two surveys (one for residents and another for program directors and designated institutional officials) using principles for survey design outlined by Artino et. al. He conducted a literature review using PUBMED, Google Scholar, JSTOR, and ERIC databases and keywords “resident career planning”, “fellowship planning”, “resident decision making”, “post-residency plans”, and “resident career development” to identify resources training institutions offer residents to help develop their post-residency plans. To review and expand the list of constructs generated from the literature review, the researcher convened a working group consisting of program directors, assistant program directors, and residents³³. The working group organized similar constructs into thematic clusters to arrive at a three-pronged conceptual model for categories of resources aiding residents in developing post-residency plans: individualization of clinical experiences, mentorship and advising, and para-clinical professional exploration.

The working group then wrote survey items to assess participant’s perceptions of the availability of each type of resource. Additional items asked participants to rate the usefulness of each resource when it was perceived to be available or how useful they believed the resource might be when it was perceived as unavailable or availability was uncertain. Participants were also asked to list additional resources that were provided by their respective programs but not represented in the survey and resources that were desired but not provided by their respective programs. Finally, demographic data was collected from resident participants. This included gender, non-MD or equivalent (e.g. MBBS, DO) degrees completed before residency, anticipated career plans at the beginning of the residency, intended careers plans at the end of residency, interest in future career in academic medicine, and resident preparedness for a career in general internal medicine. We included these specific demographics because we were interested in whether differences among residents’ characteristics and prior experiences could influence participants’ perceptions about program resources.

The items on the program director and resident surveys were identical, but the wording on the rating scale differed slightly such that residents were asked to rate

perceived availability and usefulness of the resources, while the program directors were asked to identify the actual existence of program resources and perceived usefulness of each resource to residents.

Assistant program directors, former program directors, and a graduate medical education director served as content experts and reviewed the survey to ensure items were relevant to participants and clearly assessed participants' perception of the constructs of interest. For an initial pilot test, the researcher administered the resident survey to eight junior residents and the program director survey to five associate and former program directors. HT conducted cognitive interviews on both groups using the speak aloud method to ensure that participants' understanding of each survey item aligned with the intended construct.³⁴⁻³⁶ Confusing items were reworded or eliminated based on feedback from the cognitive interviews. The final edited surveys were returned to content experts for final review before use in this study. Upon approval from content experts, the surveys were entered into a web-based survey platform (Qualtrics) for distribution.

Interview Guide Development

Drawing on results from the survey, HT and DW developed a semi-structured interview guide to explore the barriers program directors face in providing resources to residents for developing post-residency plans.³⁷ Through consultation with assistant program directors and the director of graduate medical education at one institution, the researchers designed questions to elicit program directors' thoughts on the challenges and barrier programs face with providing resources. He piloted the semi-structure interview guide with five assistant and former program directors. Based on a review of the feedback and responses from the assistant program directors, the researcher created a final version of the interview guide by eliminating some questions and adjusting others to enhance clarity.

Data Collection:

Consent

Partners Healthcare internal review board approved this study, and HT and DW conducted it in accordance with Partners Healthcare regulatory parameters. The survey introduction presented a notification of consent noting that responses to each item are

voluntary and that the researcher presumed consent from completion of the survey. Program directors gave verbal consent for recording interviews before HT conducted them. HT notified them that transcripts could be reproduced in whole or in part, but no identifying information (e.g. name, location, institution, or voice) would be presented.

Survey Administration

Program directors distributed the resident survey to PGY-3 resident using a unique link. All PGY3 (n=295) internal medicine residents enrolled in a three-year categorical internal medicine residency program at each of the eight participating programs were eligible for participation. Residents were excluded if they participated in a dedicated track combined with another specialty (e.g. medicine-dermatology and medicine-pediatrics). Duplicate responses were suppressed while maintaining anonymity using Qualtrics. Each program director also received a unique link to the program director survey. Resident and program director surveys were open for three months during the fall of the PGY-3 year (2017). Program directors were required to complete the survey at least one day before the semi-structured interview.

Semi-structured Interviews

The researcher (HT) interviewed program directors by phone using the interview guide. With permission from each participant, he audio recorded the interview. Before each interview, the researcher reviewed the program director's survey to identify any elective experiences and pathways and/or tracks offered by that specific program as well as any formal mentorship experiences. The researcher also reviewed resident surveys from the corresponding institution to identify reported gaps in current resources. He used these data to probe the program director during the semi-structured interview. The researcher transcribed each interview and removed all identifying information (e.g., names, institutions, locations, and program-specific titles) prior to analysis.

Data Analysis

Survey Analysis

HT aggregated the resident survey data and reported generated descriptive statistics. We performed χ^2 analysis to assess 2-way interactions between survey items and identify differences in survey responses based on gender and self-reported interest in a career in academic medicine. He also pooled program director survey results and

generated descriptive statistics. HT compared the responses from each program director to responses of residents from the corresponding program. HT noted discrepancies where more than 50% of the resident responses differed from the program director's response. He tabulated the number of programs where $\geq 50\%$ of residents disagreed with the program director for each item. For statistical significance, HT accepted at 2-sided $\alpha=0.05$. All analyses were performed by using STATA/MP version 14.1 (StataCorp Inc, College Station, USA).³⁸

Interview Analysis

The analysis was conducted after all of the interviews were completed. We used qualitative content analysis to identify themes to explain program directors' perceptions of barriers to providing additional resources.³⁹ HT, GG, and MJ independently reviewed and coded transcripts. We used the strategy of "immersion and crystallization" to analyze and interpret the data.^{37,40} Each investigator independently reviewed and coded the same two transcripts. We initially coded transcripts by assigning each datum referring to a specific concept a code consistent with the participant's terminology to preserve the language and meaning of the participant as much as possible and minimize inference by the researchers during early immersion. After this first round, investigators discussed and reconciled discrepancies in codes to ensure consistency between the three investigators. We then proceeded to the second round of coding. Each investigator read two additional transcripts that were not coded during round one. The transcripts were coded and investigators thereafter discussed and reconciled discrepancies in codes to compile a final code book. We subsequently performed thematic analysis to group codes to identify major themes that captured the program directors' words and phrases.³⁹ Our interpretation of the data was validated in discussion with a GME director (DW) and program directors.³⁷

Results

Resident Survey Response

Survey respondents baseline characteristics

A total 295 postgraduate year three (PGY-3) residents surveyed across eight internal medicine residency programs in the US were administered the resident survey. Of the 220 residents who began the survey, 201 residents completed it (68% overall response rate) and were included in the study cohort. The majority of the programs (6 of 8) had a response rate $\geq 67\%$ (range: 37%- 90%) (Table 1). The demographic and baseline characteristics of the participants are presented in Table 2. Of the 201 participants, 113 (56%) were men and 88 (44%) were women. About one third of the residents (n=62, 31%) completed at least one graduate degree in addition to a medical doctorate or equivalent degree before residency, of which 18 were doctoral degrees (29%) and 44 were masters degrees (71%). By the end of residency, more than half of residents felt “very prepared” or “completely prepared” to practice in general internal medicine (n=107, 53%) and had a strong interest in pursuing a career in academic medicine (n=105, 57%).

Changes in post-residency plans during residency

Nearly half of the participants (n=85, 42%) reported that their post-residency plans changed between the beginning residency and the time of survey (Table 3). At the beginning of residency, most residents planned to pursue a clinical fellowship immediately afterwards (n=149, 74%). The second and third most common intended paths were hospitalist medicine (n=21, 10%) and primary care medicine (n=19, 9%). Of those who intended to pursue hospitalist medicine, two thirds (n=14) intended to pursue a fellowship in the future. Other plans included pursuing a non-clinical fellowship or research (n=4, 2%) and healthcare management (n=2, 1%). Some residents were undecided. None of the participants reported an interested in pursuing a career in practicing medicine outside of the US.

At the end of residency, significantly fewer residents planned to pursue a fellowship immediately afterward (74% v.59%, $p < 0.01$) and significantly more residents intended to pursue hospitalist medicine immediately after residency (10% v 29%,

p<0.01). Of the residents pursuing hospitalist medicine, there was a statistically significant increase in residents with (7% v. 20%, p<0.01) and without (4% v. 9%, p=0.02) plans to pursue a fellowship in the future. There was not a significant difference in the number of residents intending to pursue a clinical fellowship at some point in their career between the beginning and the end of residency. There was no significant change in the number of residents intending to pursue primary care medicine, non-clinical fellowships, or research.

With regards to fellowships, cardiology (19%), hematology and/or oncology (14%), and pulmonary and/or critical care (11%) were the most commonly pursued fellowships among residents at the time that they entered residency (Table 4). Residents also reported interest in gastroenterology, nephrology, endocrinology, infectious disease, rheumatology, geriatrics, genetics, palliative care, and sports medicine. About 7% residents were undecided. There was no statistically significant difference in the frequency that a fellowship was desired by the time of survey compared to the beginning of residency. There was also no difference in the relative popularity of fellowships among residents intending to pursue a fellowship (Sup. Table 1). However, significantly fewer residents were undecided about fellowship choice at the end of residency compared to the beginning (7% v. 1%, p<0.01).

Perceptions about clinical elective experiences

Of the 201 residents included, 192 completed questions related to the clinical elective experience (Table 5). Half of the residents noted that clinical elective time was available to them during PGY-1, residents nearly unanimously reported clinical elective time was available during PGY-2 (95%) and PGY-3 (92%). The majority of residents (65%) thought that the amount of time for clinical electives was sufficient for developing their post-residency plans, while a third considered it insufficient and three (2%) considered it excessive. Nearly all residents also reported awareness of clinical electives in inpatient (99%) and outpatient (95%) settings during residency. Over half of residents reported opportunities for clinical electives in global health (61%) and urban settings (51%), but only 34% of residents reported opportunities for clinical electives in rural environments (34%). The majority of residents also reported that clinical electives

were available at institution unaffiliated with their residency program (86%), and most residents considered this experience useful for developing post-residency plans (60%).

Perceptions about mentorship experiences

Residents provided information on the availability and usefulness of guidance on the process and implication of applying to a variety of paths after residency. The majority of resident (70%) identified a career mentor other than their program directors, and most residents (60%) met with their mentor more than twice a year (Table 6). Regardless of whether residents identified mentor, they agreed that a career mentor was helpful for developing post-residency plans. In addition, most residents received guidance on applying to fellowship (76%), applying to academic practice-based positions (60%), and interview preparation (57%). Fewer residents received guidance on applying to non-academic practices (38%), contract negotiation (39%), CV preparation (42%), the financial implication of their career choice (22%), and the impact of different choices on their personal lives (27%) (Table 7). Residents were divided on the usefulness of these resources for developing post-residency plans. About half of residents considered guidance on applying to fellowship (56%), applying to academic practice (52%), applying to non-academic practices (45%), negotiating contracts (50%), preparing CVs (52%), and reflecting on the impact of career choices on their personal lives (51%) very useful or indispensable. Fewer residents strongly valued guidance on reflecting on the financial implication of a career choice as very useful or indispensable (38%).

Perceptions about paraclinical experiences

The survey also ascertained residents' perceptions of pathways, tracks, certification programs, research supports, and additional opportunities that allowed residents to explore interests beyond direct patient care. The survey designers considered these paraclinical resources. Approximately two-thirds of residents (63%) reported that their training institution offers at least one pathway, track, and/or certification program (Table 8). Of the remaining third of residents (37%) who did not report an available pathway, track, and/or certification program, the majority (60%) indicated that they considered these opportunities useful for developing post-residency plans.

About half of residents reported dedicated programming for primary care (52%), global health (48%), and research (42%). Other offerings included community health (11%), leadership and/or management (21%), and education (37%). Two residents noted opportunities in quality improvement and patient safety. The most commonly joined programs include primary care (13%), research (10%) and leadership/and management (5%). Primary care (73%), education (86%), and global health (71%) had the highest proportion of members who believed the experience was very useful or indispensable to developing their post-residency plans (Table 9). While half of the residents who participated in a research program (55%) strongly valued the experience, a quarter of the participating residents rated the experience not useful or only mildly useful for developing post-residency plans. None of the other programs were considered not useful by the residents who joined.

Residents also reported on the availability and usefulness of research support from their program (Table 10). Most residents (76%) reported that their programs provided dedicated research time apart from clinical duties, tracks, pathways, or certification programs while a minority believed research funds were available to support independent research or a project. A plurality of residents (43%) reported that 1-2 months of dedicated research time were available, while a minority reported >2 months were available (n=42, 21%) or <1 month was available (n=42, 21%). A minority of residents (39%) also reported the possibility of interrupting clinical training to pursue a year of dedicated research. With regards to the dedicated research time, however, most residents (62%) considered it very useful or indispensable to helping residents develop post-residency plans. Very few residents (4%) consider it not useful or only mildly useful. Other research support provided by programs include researching funding. Less than half of residents (44%) reported that research funding was available for an independent project and half of residents (50%) considered funding very useful or indispensable.

Impact of Gender on Residents' Perceptions

Early interest in clinical fellowships differs by gender

We conducted a χ^2 analysis on survey responses to assess differences in residents' perceptions and preferences based on gender. There was no significant difference in the baseline characteristics of residents by gender (Sup. Table B). Male and female residents reported completing non-MD degrees before residency at the same rate and rated their preparedness for a career in GIM at the end of residency similarly. In our cohort, a higher proportion of female residents reported a strong interest in a future career in academic medicine, but the difference was not statistically significant (62% v 53%, $p=0.26$). However, a significantly higher proportion of male residents (80% v. 67%, $p=0.04$) reported that they intended to pursue a clinical fellowship immediately after residency at the time that they began their training (Table 11). By the third year of training, a higher proportion of male residents (62%) than female residents (54%) still intended to pursue fellowship immediately after residency in our cohort, but this difference was no longer statistically significant (Sup. Table C). There was no statistically significant difference between the proportion of male and female residents interested in pursuing other paths.

The specialty of the fellowships selected also differed by gender. An analysis of fellowship choices showed that a higher proportion of male residents intended to pursue cardiology than female residents at the time they began their residency (28% v 11%, $p<0.01$) (Table 12). This difference in preference for pursuing a cardiology clinical fellowship narrowed but remained significant by the third year of training (27% v 14%, $p=0.03$) (Table 13). In addition, a higher proportion of female residents (8%) intended to pursue rheumatology than male residents (1%) by their third year of training ($p=0.01$). Residents did not significantly differ in their preference of any other fellowships at the beginning of residency or by the final year of training.

Female residents were less likely to received guidance on applying to practice-based positions

We also assessed differences in perceptions of mentorship experiences by gender (Table 14). In our cohort, a higher proportion of female residents (78% v. 65%) found a mentor other than their program directors who played a critical role in the

development of their post-residency plans, but this difference was not statistically significant ($p=0.08$). Male and female residents agreed that finding a career mentor was useful for developing post-residency plans at similar rates. Among those who identified career mentors, the majority of male and female residents reported meeting with mentors regularly (86% v. 85%).

Despite reporting similar experiences with identifying career mentors, a substantially lower proportion of female residents received guidance on applying to practice-based positions (Table 15). Although most residents received guidance on applying to academic practices, female residents were significantly less likely to receive this guidance (54% v. 71%, $p=0.01$). There was no difference in the proportion of residents who consider guidance on academic careers very useful for or indispensable to developing their post-residency plans ($p=0.73$) (Table 16). A similar pattern was seen between female and male residents with respect to guidance on applying to non-academic positions. Female residents were less likely to receive guidance (32% v. 47%, $p=0.04$) but were just as likely to rate it as very useful for developing post-residency plans ($p=0.91$).

This disparity did not extend to all mentorship experiences. Male and female residents reported similar rates of receiving guidance on applying to fellowships, negotiating contracts, preparing CVs, and preparing for interviews. Notably, a higher proportion of female residents considered guidance on contract negotiations very useful for or indispensable to developing their post-residency plans (59% v. 42%, $p=0.01$) despite both genders receiving guidance at similar rates.

Female residents may benefit less from research supports

Among programs that offered tracks, pathways, and/or certification programs, male and female residents reported similar awareness of programming for community health ($p=0.28$), global health ($p=0.93$), research ($p=0.93$), and education ($p=0.16$) (Table 17). Female residents were more likely to report the availability of primary care programs (94% v. 75%, $p<0.01$) and less likely to report the availability of leadership and/or management programs (24% v. 41%, $p=0.05$). Despite these differences there was no significant difference in the rate that male and female residents participated in these programs (Sup. Table D). Furthermore, residents were equally likely to rate most

of the programs they participated in as very useful or indispensable to developing their post-residency plans (Table 18). Research programs were the one exception. A lower proportion of female residents found the research program they participated in useful compared to male residents (25% v. 75%, $p=0.03$). Notably, there was no significant difference in the perception of the availability and usefulness of dedicated time for independent research between gender (Sup. Table E). While male and female gender similarly valued research funding ($p=0.60$), a lower proportion of female residents reported that funding was available for research and independent projects (38% v. 58%, $p<0.01$) (Table 19).

Impact of Interest in Academic Medicine on Residents' Perceptions

Hospitalist medicine may serve as a bridge to future fellowships for residents interested in academic medicine

Residents who reported a strong interest in academic medicine had similar baseline characteristics and perceptions compared to residents who did not report a strong interest (Sup. Table F). The two groups completed non-MD degrees at similar rates and rated their preparedness for a career in GIM similarly. At the time residents began residency, the groups also had similar preferences for post-residency plans including clinical fellowship, hospitalist medicine, and primary care medicine (Table 20). Residents strongly interested in academic medicine were more likely to pursue hospitalist positions than those who were not strongly interested by the time of survey (35% v 23%, $p=0.05$) (Table 21). There was no difference in residents' intention to pursue a fellowship at this time point. Notably, a higher proportion of residents interested in academic medicine intended to pursue fellowship training in hematology and/or oncology by their third year of medicine (18% v. 7%, $p=0.02$) (Table 22). Otherwise, clinical focus of the fellowships residents selected did not significantly differ based on their interest in academic medicine (Sup. Table G).

A subset analysis showed that residents with a strong interest in an academic medical career are more likely to pursue hospitalist medicine as a bridge to a future fellowship (10% v 3%, $p=0.04$). This pattern became more pronounced by the end of the third year of residency. A substantial proportion of residents who intended to pursue hospitalist medicine planned to do so as a bridge to future fellowships (28% v. 11%,

p<0.01). There was no significant difference in the rate that residents pursued hospitalist medicine as a terminal career based on an interest in academic medicine.

Strong Interest in academic medicine is associated with a strong value of mentorship experiences

Although there was no significant difference in resident's perception of access to mentorship experiences, residents with a strong interest in academic medicine appeared to use and value these experiences more (Table 23). Residents with a strong interest in academic medicine were significantly more likely to identify a career mentor in addition to their program director compared to residents who did not report a strong interest. They were also more likely to agree that having a mentor was useful for making post residency plans in this cohort, but it was not statically significant. Nonetheless, those with an interest in academic medicine were more likely to report frequent meetings with their mentor. Two thirds of residents with a strong interest in academic medicine met with their mentors at least two times annually compared to only half of the remaining residents (p=0.03).

Our analysis demonstrated a similar pattern between the guidance residents received and how they valued that guidance (Sup. Table H). There was no difference between the guidance residents received based on interest in academic medicine, but a higher proportion of residents interested in academic careers rated all guidance as very useful or indispensable compared to their other colleagues (Table 24). Notably, residents interested in academic careers also more strongly valued guidance on applying to non-academic practices and on considering the financial implications of their career choices and the impact of career choices on their personal lives.

Research supports are highly valued among residents with a strong interest in academic medicine

We also analyzed the relationship between residents' perceptions of research supports and interest in academic medicine (Table 25). While we found no significant difference in the perception of the availability of research support, residents interested in academic tended to rate these supports higher (Table 26). Specifically, residents were equally aware of dedicated research time and funds.

Program Director Responses

Summary of resources offered at participating programs according to program directors

All eight program directors completed a survey detailing the resources offered by their programs. All programs offered clinical elective experiences during PGY-2 and PGY-3 of residency while only six programs provided elective time to PGY-1 residents (Table 27). All programs provide experiences in inpatient, outpatient, and global health settings in addition to allowing residents to pursue rotations outside of their institution. The majority of program directors reported that the elective time is sufficient (5 of 8), while three directors thought it was inadequate at their institutions. Interestingly, the majority of program directors (6) considered external rotation experiences very useful or indispensable to helping residents develop post-residency plans.

While all programs assigned mentors, there was no consensus about the mentorship experiences between the institutions. For example, half of programs thought their residents met with their mentors twice per year on average while the other half were evenly split between their residents meeting mentors once a year and more than twice a year (Table 28). The majority of program directors reported that they offered all the mentorship experiences asked on the survey with the exception of guidance on the implication of career choice (4 of 8) (Table 29). When asked to rate the usefulness of these experiences, the majority of program directors believed guidance on apply to fellowship and interview preparation were very useful or indispensable while considering other experience including guidance on applying to practice-based positions less useful.

Program directors also reported a variety of tracks, pathways, and certification programs and research supports. A majority of programs had dedicated primary care programs, half had dedicated research or global health programs, and a minority had education or leadership and/or management programs (Table 30). All of these programs were provided directly through the residency program. In addition, all but one residency offered dedicated research time, the majority of which offered >2 months of research time. The majority also offered research funds to pursue independent projects. A minority of program directors considered both research time and funds very useful or indispensable for developing post-residency plans.

Residents disagree on the availability and value of mentorship experiences and research supports

While residents largely agreed with their program directors on the clinical experiences offered, there were notable disagreements about the availability and value of mentorship experiences and research supports. For 6 of the 8 programs, more than half of the residents in each program disagreed with their program director about how often they met with their mentors. For 5 of the programs, more than half of the residents met with their mentors more often than their program directors expected. More than half of the residents met with their program directors less than expected for two programs.

Although 5 of 8 programs noted that they offered guidance on contract negotiation or CV preparation, more than 50% of residents in 4 programs were unaware of guidance on these two topics was available. A similar pattern was observed for the availability of interview preparation. Notably, the disagreement was bidirectional. In the case of guidance on the financial implications of career choices, more than half of the residents were unaware of resources from 4 programs that offered it while more than half of residents received this guidance from two programs who reported they did not offer it. In general, residents were more likely to rate guidance on applying to practice-based positions an, contraction negation, and CV preparation as more useful than their program directors considered it.

Residents were less likely to report that research supports were available than their program directors. In the majority of programs (6 of 8), more than half of the residents believed that less research time was available than was reported by the program director. Although only 5 programs offered funds to residents for independent, over 40% of residents in 3 of those programs were unaware that research funds were available. For all programs, more than half of residents believed that dedicated research time and fund were very useful or indefensible to developing career plans while less than half of program directors agreed.

Understanding barriers to supporting residents in developing post-residency plans

All eight program directors completed semi-structured phone interviews exploring the challenges to providing resources for post-residency planning. We identified four themes that underpin barriers that programs face. The themes were: 1.) negotiating

competing demands amongst stakeholders, 2.) developing resources deliberately, 3.) maximizing the value of limited resources, and 4.) cultivating social capital.

Negotiating competing demands amongst stakeholders

In developing and distributing resources for post-residency planning, program directors must balance the conflicting demands of several stakeholders. First, directors must balance residents' interests in developing plans for post-residency training against their own interest in ensuring residents complete requisite clinical training. In addition, they must balance residents' time by considering institutional needs for residents to provide patient care, expectations of fellowship directors and potential employers for applicants to be available for interviews, and requirements from regulatory bodies such as the American College of Graduate Medical Education (ACGME) and the American Board of Internal Medicine (ABIM). At times, the interests of these four stakeholders align. Residents, future employers and trainers, the hospital, and regulatory bodies are all invested in residents becoming clinically competent providers. In completing mandatory rotations for example, residents can sample a variety of clinical practices, meet new mentors, and better define their clinical interests while becoming competitive applicants, satisfying requirements, and ensuring patients receive care.

However, providing resources for residents to develop their post-residency plans becomes challenging when the demands of non-resident stakeholders diverge. Stipulations by regulatory bodies, for example, leave little room for "innovation." The time-based requirements from the ABIM limits residents' research time and non-clinical elective experiences. Meanwhile, training institutions have patient care needs, to which residents are indispensable. Ensuring that residents cover essential clinical services limits elective experiences in a variety of clinical (e.g. outpatient and global) and non-clinical (e.g. pathways and independent projects) settings. For example, a program that prioritizes sharing large projects or research experiences among residents who have self-identified a common interest has struggled to align resident's schedules due to institutional patient care needs rather than residents' educational needs. This barrier to synchronizing residents' schedules undercuts the interclass (i.e. PGY-2 & PGY-3) group-based nucleation of ideas that may help residents reflect on future interests and

complete projects that advance their goals for after residency. These same demands can make it challenging for residents to meet the expectations of fellowship directors or other future employers. Programs comment that research pressure arising from competitive fellowships have created a quandary for how to provide critical research experience while remaining within regulatory restrictions and house staff requirements.

[A resident says,] “maybe I want to just be a generalist and see patients either in the inpatient setting or the outpatient setting as a generalist.” Those things you need some time to explore, and one of the things that our program is limited to is, partly by external forces and partly by internal choices, limits the ability for residents to kind of fully explore that during their busy residency... the biggest external force is the ACGME. (Program B)

So, I think ACGME and the ABIM need to start speaking the same language. The ACGME believes in competency-based education, which believes that competencies are independent of time spent in training. The ABIM feels very strongly that a certain number of months of training are required. I think that, uh, we should be much more nimble in determining how much clinical training someone needs. And so, we should be able to create customized pathways. People should be able to test out of stuff. People should be able to have shorter, you know, clinical experiences. (Program H).

Furthermore, residents’ interests evolve with each cohort, requiring programs to continuously adapt. Even with a well-developed variety of pathways, clinical electives, and mentorship experiences, programs have found that residents’ interests often span the different areas of focus without fitting neatly into one area. To effectively serve residents, programs must continue to change programming and connect residents with additional resources to meet’s residents’ individual needs while satisfying the group. Some residents’ interests have expanded to areas so far outside of clinical medicine that some program directors believe supporting them to the same extent falls outside the mission and priorities of the program.

And quite frankly ... there’s usually one or two who are going to end up going into consulting or business or something along those lines. We just don’t provide as much support for those individuals ... I can’t tell you that that actually represents an institutional priority for us because I don’t think that that’s really what we’re what we’re really looking to promote within the residency..., (Program B)

Thus, program directors must carefully negotiate competing demands between several stakeholders including residents, employers, and regulatory bodies, and carefully prioritize the resources that best fit their program's and residents' interests in order to resolve or at minimum mitigate the tensions among competing demands.

Developing resources deliberately

Programs provide a variety of clinical, nonclinical, and mentorship experiences to residents to guide their maturation as physicians and develop post-residency plans. Many of the resources available to residents are predicated on the existing infrastructure within the Department of Medicine at their training institutions. For example, clinical experiences are limited to the scope of care provided by the training institution and pre-existing clinical relationships with other practices. Programs with residents who identified a need for greater community-based outpatient exposure or a particular subspecialty elective not within the usual scope of practice were required to defer the experience unless programs could devise a creative individualized solution. These solutions were often contingent on serendipitous or special relationships between single faculty members and someone outside of the institution who might be able to facilitate the experience for the resident. One program in particular discussed the challenges of procuring funds and faculty to formalize a primary care track at their institution and guarantee expanded exposure for residents. Without these institutional commitments, the program had to rely on chance and informal channels to provide these experiences for their residents rather than deliberately designing the meaningful experiences their residents desire.

While less resourced programs may struggle more with providing a wide array of clinical experiences, each program acknowledged difficulty with deliberately developing mentorship resources. Every program greatly valued mentorship and had a variety of formulations for providing quality experiences to residents. Some programs prioritized seniority in mentors, hoping that the wealth of experience of seasoned faculty would aid residents best in weighing their different options. Others valued enthusiasm as a trait among mentors and focused on empowering faculty who were already passionate about

residents' success. Another approach to selecting faculty was recruiting and retaining those mentors in the community who had won awards or praise from previous residents. Each of these strategies demonstrate a clear interest in carefully identifying the individuals most likely to help residents develop their plans; however, they also highlight the challenge programs face in providing formal training opportunities and faculty development that could allow a greater range of faculty to contribute to and succeed in a mentorship capacity.

As far as the mentors go we tend to choose from people who have received accolades for having been successful mentors in the past and they tend to be fairly senior. And we offer them an article on mentoring and when we get feedback that they are ...if we get feedback on how they can be better mentors, we pass that on to them as well. We have a social event where we congratulate them and thank them, and at our resident research celebration, we give awards out to mentors. But there's no formal training process that we go through. We take people who we think are already pretty seasoned mentors. (Program A)

Even if program directors have ideas for how they would like to improve their programs, and career advising specifically, they often lack the resources necessary to bring these plans to fruition. For example, in the case of ameliorating mentorship opportunities for residents, attempts to improve faculty development fail to gain traction due to limited time, funds, and incentives. Faculty have busy clinical schedules, heavy research loads, and/or other pressing commitments, and there are limited funds to compensate them for their time and efforts. In addition, scheduling in-person sessions requires the coordination of many busy and often inflexible schedules. Further, even if faculty are willing to volunteer their expertise without direct financial compensation, their efforts are often not recognized or rewarded by the institutions in which they work in ways that are critical to faculty advancement (e.g. promotions). As a result, programs have to make due with mentorship and other resources in their present form and are limited in their ability to deliberately mold them to better serve their residents.

They volunteer, or they asked to become part of the firm, and then even out of the people that ask, we select a subset that we recognize as outstanding educators and committed to the house staff. So those are the criteria that we look for. And then in of ah, assignment to a firm its, each firm has a... our goal is to maintain diversity in both. In all aspects of

which you might guess: gender, specialty, career track, those types of attributes. (Program E)

Maximizing the value of limited resources

Although all residency programs contend with limited resources, each program invested in various opportunities differentially, thus offering their residents diverse options for exploration. As they develop these and other resources, programs struggle with how to maximize the value of each opportunity. Program directors reported challenges with effectively advertising and communicating what they offered as well as connecting residents with appropriate resources. For example, several programs noted residents' confusion about the difference between "tracks" and "pathways". Others talked about challenges with helping residents select experiences that could best advance their goals.

Programs were in agreement that helping residents effectively connect with appropriate resources requires effective mentorship. In the case of one program, a small core team of faculty for the residency has proven indispensable to monitoring the connectedness of each of its residents. While smaller programs felt this team was usually sufficient, larger programs often created smaller groupings within the residency (e.g. firms or societies) to allow for small tightly-knitted communities. Such communities not only connected residents across years allowing for peer-to-peer mentorship, but also often has specific faculty assigned to the group who were able to develop longitudinal relationships with a smaller group of residents. In addition, joining pathways, tracks, and/or other nonclinical elective programs created opportunities for residents to explore and meet potential mentors. This is one example of how programs used overlap and intersection among distinct classes of resources to maximize their value for residents. While these initiatives are purposefully overlapping and non-hierarchical to create multiple points of entry for residents seeking opportunities and mentorship, this design may also create confusion about the role of each program. In addition, programs struggled with providing a balance of redundancy to ensure residents' interests are met without unnecessarily reproducing efforts and thereby taxing limited resources.

*“... basically the biggest thing that we've learned over time is that trying to understand why they're looking for a mentor and what they're hoping to get out of that relationship is really important when matchmaking.
(Program D)*

Assisting residents in identifying personal mentors remains a challenge despite these efforts. Programs have coped with this challenge both by relying on their core teams and by shifting from pre-assigned mentors to a strategy of helping residents reflect on their interests early and connecting them with mentors who align with these interests. Coupling this with a full offering of other opportunities theoretically allows residents to accumulate the relationships and experiences necessary to develop and achieve their post-residency plans.

A limitation many programs face is not formally surveying their residents on how resources offered by the program are working for them and if there are needs that are not being met. This represents an important opportunity gap given that if programs knew about residents' most significant needs they could potentially modify or adjust programming differentially in ways that would be of greatest value to their residents. Currently, programs draw primarily on anecdotal data and proxy measures (e.g. resident publications) to gauge residents' happiness and satisfaction with current offerings. While there is a general sense that the programs work for many, program directors remain committed to ensuring that it serves all of their residents. Many program directors acknowledged the need for formal data collection (as it rarely exists currently) and implementing processes to evaluate the utility of the resource programs offer in order to maximize their value to residents.

So, I think we need to be asking that question specifically and I don't think that we are doing a formal evaluation, so I think that could be an area we could develop further by ensuring we have the right metrics. Because not only is the mentorship program organic, our sense of its success is organics. You know, we like that everyone got publications. My current sense is that everybody's happy, by and large, with something. It may not be the best thing they got, but uh, everybody's got a poster, somebody's got a presentation, somebody got a publication. I don't think there's anybody who had been left behind. (Program H)

Cultivating social capital

In many cases, developing novel experiences for residents requires expertise beyond usual clinical practice. Many program directors refer to the importance of leveraging the expertise of others from the larger institution or forming relationship with external bodies that might provide additional opportunities for residents to explore their interests and develop their post-residency plans. For example, the business and/or leadership pathways often draw heavily on input from executives of the larger institution, and research projects pursued by residents may benefit from mentorship by faculty at affiliated schools of public health or business schools. Beyond providing resources and infrastructure, programs are tasked with facilitating these connections and brokering collaborations to create meaningful experiences.

'I can think of a thousand ways, to be honest. There are so many ways, and it's a big enterprise... there are so many unseen silos of expertise and initiatives and efforts that are being made across the university that... if they were aligned or even if they can be partnered together in some fashion would help everyone. So, I think that's what we've tried to do with the pathways, but it's really of Herculean task to know everything that's going on and get everybody to work.' (Program E)

For small and large programs alike, program directors noted that information about resources and opportunities was often found within the knowledge of key informants rather than easily accessible centralized repositories. Having relationships with these informants played a critical role in identifying novel opportunities for residents as well as navigating common post-residency career planning pathways (e.g. applying to fellowships). Some program directors noted that they were unsure of how competitive their residents were for certain fellowship because the characteristics of successful applicants are not readily available; this was a barrier identified by program directors to advising residents applying to fellowships appropriately. Another director partnered with local medical societies to improve residents' access to career planning resources and job opportunities.

One of the things that I recommend is joining the medical society, and that's a really good avenue for residents to approach a more widespread view of what's available to them. The medical society at least the [chapter names of two] County Medical Society is free of charge for the residents,

and they hold events, you know. There's mixer events and other events that are available to residents as part of their membership to the society. They also allow the residents also have access to things like career planning, contract reviews, that's actually I believe free of charge through the medical society, and I'm part of the board for the for the medical society as well (Program G)

Similarly, cross-institutional relationships allowed mentors to help their residents develop custom paths. One program director connected a resident with a colleague from another institution who was able to create a position that perfectly fit the resident's multifaceted interests; this was a connection that depended on a directors' personal relationship and would not have been accessible to residents otherwise. Occasionally the accumulating social and cultural capital of a program created a positive feedback loop. For example, alumni of programs have made large donations that help formalize and institutionalize resources and opportunities for present residents. Similarly, alumni create pipelines for future job and/or fellowship placements for residents that follow in their footsteps. Larger, more connected institutions experience the challenge of maintaining these important relationships while smaller institutions often struggle to cultivate them.

There's lots of nichey fellowships. There's lots of other clinical or professional activities that people can incorporate into their jobs depending on what they do. And I think that there's no guidebook for residents or faculty about that. It becomes very much a kind of local cultural, institutional, knowledge that people have and just the serendipity of, "oh, hey, I know about this thing and you seem like the type of person that would be a good fit for it," but like serendipity that might happen... (Program D)

'And we have an incredible panel of luminaries from around the country and around [major city] who come during those two-week blocks and talk to the residents. In addition, each resident does an individual project. And then all the residents together are doing collective projects. It has been very generously funded by one of our graduates who has been very successful in biomedical research (Program A)

Discussion

This multi-institutional study of internal medicine residencies confirms that many residents change their plans during training and demonstrates that they value a variety of resources in developing their post-residency plans. By the time of survey, nearly half of the residents changed their plans, resulting in a reduction in the proportion of residents pursuing fellowships and an increase in the proportion pursuing hospitalist medicine. Notably, residents were more likely to pursue hospitalist medicine both as a path to pursue future fellowships and as a terminal career. Although the relative preference of fellowship did not differ significantly between the beginning to end of residency, we showed that a third of residents switch their fellowship plans.

Studies of post-residency career plans have demonstrated a shift in residents preferences away from pursue general internal medicine practice to increased subspecialty training over the past four decades.^{5,13,41-45} Our study shows that this trend has continued. Compared to an assessment of residents' plans from 2012, our study found a similar level of interest in pursuing subspecialty training, but a greater proportion of our cohort planned to pursue hospitalist medicine and a smaller proportion primary care.⁵ This increased preference for hospitalist medicine is consistent with pre-existing trends and likely partially due to the large academic urban programs represented in this sample.^{13,41}

We also showed that the evolution of residents' post-residency plans differed by gender and interest in academic medicine. While a significantly smaller proportion of female residents intended to pursue fellowship compared to male residents when they began, the gap narrowed, and the difference was no longer significant by the time of survey. There have been several reports demonstrating that female residents are more likely to pursue primary care than their male counterparts.^{5,13} Although the overall gender ratio of our cohort is similar to recent studies, we did not detect a difference in interest in primary care in gender. To our knowledge, recent studies have not reported how residents differ in their pursuit of subspecialty training compared to general medicine training by gender.

Individual specialties have published reports on gender disparity within their discipline. Despite multiple decades of efforts to address gender disparities, cardiology struggles to increase the representation of women in training programs.⁴⁶ Recent studies have also shown continued disparity in the advancement, sub-specialization, and compensation of female cardiologists.⁴⁷⁻⁵¹ In alignment with our findings, these studies have found that only about 12% female physicians pursue a career in cardiology.⁵⁰ We found that female residents remain significantly less likely than male resident to pursue cardiology at the beginning residency, and this trend continued through the time of survey. The continuity of this disparity suggests that the factors that dissuade female medical trainees from pursuing cardiology may take root well before residency begins. Further investigation is needed to better characterize potential deterrents to female residents in order to understand and alter the current pattern.

In addition to characterizing the arc of residents' career plans, our study defined the range of resources that the residents perceived as available and valuable for developing post-residency plans. Residency resources consisted of clinical resources, mentorship resources, and paraclinical resources (i.e. the elements of pathways, tracks, certification programs, research supports, and additional opportunities that allow residents to explore interests beyond direct patient care). In general, residents across all program valued all three categories of resources in developing their post-residency plans. In particular, residents agreed that identifying a career mentor facilitates the development of post-residency plans regardless of whether they had identified a mentor. These results were most pronounced among residents who reported a strong interest in academic medicine. They were more likely to strongly value mentorship experience and research supports compared to residents who did not have a strong interest in academic medicine. In general, residents who joined a dedicated pathway, track, or certification program also felt they played a pivotal role in helping them develop their post-residency plans.

Residents also differed in their perception of mentorship resources by gender. Female residents were less likely to report the availability of some resources despite valuing them equally to their male colleagues. For example, female residents were slightly more likely than male residents to identify career mentors and equally as likely

to value mentorship and meet with their mentors regularly. Nonetheless, they were less likely to receive guidance on applying to practice-based positions and less likely to be aware of research funds despite being equally likely to value those resources. Other times, female residents had similar perceptions of the availability of resources and equal rates of resource utilization but had differing experiences with the resource. In our study, dedicated research programs were the clearest example of this. Female residents were much less likely to report that these programs were very useful or indispensable than their male colleagues. In fact, some female residents said it was not useful at all for developing post-residency plans.

Gaps in mentorship are of great interest given the importance of mentors in helping physicians at many stage of training and practice to develop and advance their careers.^{52,53} In addition to helping physicians articulate their goals and chart their career paths, effective mentorship relationships may provide access to competitive subspecialties, improve retention of physicians in academic practices, and lower stress related to career planning.^{15,52-54} Recent studies have focused on the importance of mentorship networks given the improbability of finding a single person who can satisfy the diverse needs of a trainee.⁵⁵ Even as mentorship networks become more complex, female physicians often benefit less from their mentorship experiences than their male colleagues. Similar to our findings, female residents and junior faculty alike may have less guidance on opportunities appropriate for them or receives less support in pursuing those opportunities.⁵⁵⁻⁵⁷ Studies of female advancement in corporations have revealed that women often lack sponsors – senior individuals who advocate for them to be promoted or considered for key opportunities – in spite of cultivating a robust mentorship network.^{58,59} This contributes to the disparity in career advancement of women in other industries. Additional studies are needed to evaluate the role sponsors for physician across their training, whether disparities exist by gender and strategies for overcoming them.

As residency programs attempt to address these shortcomings and improve resources for developing post-residency plans, they face a number of hurdles. Interviews with program directors revealed challenges with 1.) negotiating competing demands among stake holders, 2.) developing resources deliberately, 3.) maximizing

the value of limited resources, and 4.) cultivating social capital. The nature of these challenges differs immensely. Negotiating competing demands requires institutions to consider the relationship of their residency with external actors (i.e. regulatory bodies and future employers or training programs), vital functions of the overall institution (i.e. patient care), and the program's mission. Program directors cannot eliminate much less decrease the tension between these stakeholders, but their choices about how to address them reflects the priorities of the program in the context of resource constraints. While challenges with developing resources deliberately highlights resource gaps, challenges with maximizing value highlights process gaps. Social capital reflects the cumulative relationships and connections built by a program and its affiliates.

The challenges related to process gaps and resource gaps according to program directors strongly align with our quantitative findings. Program directors often reported that their programs were working well largely based on anecdotal data but often lacked rigorous program evaluation methods for resources. Our survey revealed considerable disagreement between residents and their program directors about both the availability and value of mentorship resources and research supports. Program directors often underestimated how often residents met with mentor and rated the usefulness of mentorship experiences lower than residents did. Residents were less aware of certain resources, such as research funds, that many reported were very useful or indispensable. This disagreement between the program directors and residents highlights how challenges with systemically evaluating programming complicates maximizing the value of existing resources. While programs need more data to maximize the value of resources, they must also find strategies to overcome cost, time, and faculty constraints to further develop and improve their resources.

The difference in the perceptions of resources by gender and, to a lesser extent, by interest in a career in academic medicine makes clear that program directors must carefully consider the identities and interests of the individuals their resources serve. Despite similarly valuing resources, we showed several areas, including guidance on practice-based positions and research funds, where female residents reported receiving less support from their programs. The disparity in the perceived usefulness of dedicated research program by gender despite equal participation demonstrates how residents of

differing characteristics may have divergent experiences from the same opportunities. Development of future resources and improvement of existing ones should consider how the initiative might disparately affect different residents in addition to building evaluation systems that specific monitor for difference in perceptions and experiences by identity and/or interests.

While residencies should focus their energies on building functional programs and developing faculty mentors, cultivating the social and cultural capital of their institutions may prove equally important to providing residents with worthwhile opportunities for self-exploration. First described by French sociology Pierre Bourdieu, social capital refers to resources gained through relationship to others and membership in a larger social network while cultural capital refers to a collection of esoteric valuable knowledge or skills that can be transformed into economic or symbolic gain.⁶⁰ Program directors clearly articulated the role of relationships with alumni, other institutions, and local societies in developing important opportunities for residents. In addition, the acknowledgement that information often lies within key informants provides evidence for value of cultural capital. Currently smaller less-funded institutions face greater barriers to cultivating these relationships. These programs usually lack the diversity of subspecialty faculty or an alumni-base the feeds backs critical information or donations. More research is needed to investigate whether providing more data on successful applicants to fellowship or incentives for partnerships with larger tertiary institutions weaken some of these barriers.

While interpreting this data, it is important to acknowledge that our study cohort arises from a small sample of PGY-3 internal medicine residents in the United States. Many of the residents in our sample are training in large academic institution and many of their residencies are also located in the northeast. While certainly this could suggest that our results reflect idiosyncrasies of large northeastern academic program, the alignment of our data with prior national studies is reassuring. The gender balance, preference to pursue fellowship at the end of residency, and distribution of residents' subspecialty preference largely matched previous reports. Residents interested in primary care may have been slightly under-represented in our sample while residents interested in hospitalist medicine may have been slightly over-represented compared to

prior studies. Nonetheless, the inclusion of programs in different clinical settings and regions and the general concordance of our findings with prior data suggests that our work provides worthwhile insights into perceptions of resources that many internal medicine residents use to develop post-residency plans. Future work would certainly benefit from a larger sample of programs from different regions of the United States.

We also developed the survey tool for this study since no validated survey sufficiently ascertained our research question. While the survey has not been fully validated, the survey items were rigorously composed following well-accepted methodology. They underwent extensive pilot testing and cognitive interviewing to ensure items were clear, and they were carefully reviewed by content experts. We acknowledge that this does not guarantee content validity. Where possible, we aligned our findings with multiple prior studies and generally found concordance, which provides a strong basis for believing our results. Future work could further assess the validity of this survey in a variety of residency programs. This would provide a basis for understanding how perceptions of resources might differ across a variety of fields of interests. This study was constrained to internal medicine residencies and cannot be generalized beyond them. Pursuing an interdisciplinary study across interventional and noninterventional specialties may clarify relationships between residency-specific resources and post-residency planning. It may also highlight areas where residencies may benefit from coordinating efforts between programs in the same institution or among local institutions.

In addition, we used a cross-sectional study design to understand the experience of residents. It is possible that the perceptions of one class of residents may not reflect the experiences of others. We suspect that the interests and perceptions of most residents across eight institutions are unlikely to differ significantly from others at their institutions from year to year. Because we only measure one time point (i.e. fall of 2017), we are unable to capture the real-time evolution of residents' post-residency plan development. Recall bias may affect our data about residents' interests at the beginning of residency, especially since residents reflected back after definitively choosing what they planned to do afterward. We are reassured by the alignment of our findings about changes in plans with recent studies. Nonetheless, a long-term cohort study would

eliminate this risk of bias, create more time points to understand the evolution of the post-residency plan development process, and provide insights into how residents' perceptions of these resources change after completing residency training. While it is worthwhile to understand the value of resources for developing plans, this study cannot ultimately comment on the utility of these resources in helping residents fulfill those plans.

Furthermore, the qualitative component of the study only included program directors. Program directors from residencies located in different regions and of varying sizes addressed many of the same themes. Although they provided critical insights into the barriers to providing residency-specific resources, inclusion of designator institutional officials may have provided more insight into the challenges of coordinating residency-level initiatives with the efforts of the larger institution. In addition, our interviews captured barriers to developing and maintaining resources, but interviews of residents would better explore barriers to resource access and utilization.

Despite these limitations we confirmed that nearly half of residents changed their plans during residency. To aid this process, programs provide residents with clinical, mentorship, and paraclinical resources. While residents value resources in all categories, they particularly agreed on the usefulness of identifying a career mentor and the value of research supports. Residents disagreed with their program directors about the availability and value of mentorship and research supports and there were notable differences based on gender and interest in academic medicine. Therefore, while programs face many barriers to developing and improving resources, future initiatives should rigorously evaluate the efficacy of developed resources with explicit attention to the differences in outcome based on residents' identities and/or interests.

Tables

Table 1. Program Response Rate

Program	Location	Type	# of Respondents	Total Eligible	Response Rate
A	Northeast	Academic	34	44	68%
B	Northeast	Academic	44	49	90%
C	Northeast	Academic	16	24	67%
D	Northeast	Community	9	12	75%
E	Mid Atlantic	Academic	29	36	80%
F	Northeast	Academic	27	50	54%
G	Mid Atlantic	Community	28	31	90%
H	South	Academic	18	49	37%
Total			201	295	68%

Table 2. Baseline characteristics and perceptions of residents

Characteristics/ Perceptions	Total Residents (n=201)
Gender	
Male	113 (56%)
Female	88 (43%)
Completed a Non-MD Degree Before Residency	62 (31%)
Doctor of Basic Science	17 (9%)
Doctor of Social Science, Humanities, or Education	1 (2%)
Master of Basic Sciences	10 (16%)
Master of Education	1 (2%)
Master of Business Administration	5 (8%)
Master of Public Health	16 (8%)
Master of Public Policy	3 (1%)
Other Masters*	9 (4%)
Prepared to practice in GIM After Residency	
Not at all	5 (2%)
Mildly or Moderately	89 (44%)
Very or Completely	107 (53%)
Strong Interest in Academic Career After Residency	105 (57%)

*Other masters degrees include Masters in Health Sciences, Masters of Clinical Research, and Masters of Bioethics.

Data is presented as total respondents with percentages in parentheses.

Abbreviation: GIM (General Internal Medicine)

Table 3. Post-Residency Plans

Plans	Beginning of Residency (n=201)	End of Residency (n=201)	p-value
Clinical Fellowship	149 (74%)	118 (59%)	p<0.001
Hospitalist Medicine	21(10%)	59 (29%)	p<0.001
Plan to Pursue Fellowship Later	14 (7%)	40 (20%)	p<0.001
No Plans to Pursue Fellowship	7 (4%)	19 (9%)	p=0.02
Primary Care Medicine	19 (9%)	22 (11%)	p=0.74
Non-clinical Fellowship or Research	4 (2%)	8 (4%)	p=0.24
Opportunity Apart from Clinical Practice	8 (4%)	15 (7%)	p=0.13
Medical Practice outside the US	0 (0%)	1 (1%)	p=0.32

Data is presented as total respondents with percentages in parentheses.

Table 4. Fellowships residents intended to pursue

Specialty	Beginning of Residency (n=201)	End of Residency (n=201)	p-value
Cardiology	38 (19%)	35 (17%)	p=0.60
Pulmonary and/or Critical Care	22 (11%)	17 (8%)	p=0.40
Hematology and/or Oncology	29 (14%)	20 (10%)	p=0.17
Gastroenterology	12 (6%)	8 (4%)	p=0.36
Nephrology	7 (3%)	5 (2%)	p=0.56
Endocrinology	5 (2%)	5 (2%)	p=1.00
Infectious Disease	10 (5%)	11 (6%)	p=0.82
Rheumatology	7 (3%)	7 (3%)	p=1.00
Geriatrics	1 (1%)	2 (1%)	p=0.56
Undecided	14 (7%)	2 (1%)	p<0.01
Other	4 (2%)	6 (3%)	P=0.52

Data is presented as total respondents with percentages in parentheses.

Table 5. Perceptions of the availability of clinical experiences

Clinical Elective Experience	Total Residents (n=192)
Availability of Clinical Elective Time	
PGY-1	87 (50%)
PGY-2	183 (95%)
PGY-3	177 (92%)
Availability of Clinical Setting	
Inpatient	190 (99%)
Outpatient	182 (95%)
Rural	66 (34%)
Urban	98 (51%)
Global Health	118 (61%)
External	166 (86%)
Sufficiency of Elective Time	
Inadequate	64 (33%)
Sufficient	125 (65%)
Excessive	3 (2%)
External Electives Critical for Developing Post-Residency Plans	115 (60%)

Data is presented as total respondents with percentages in parentheses.

Abbreviation: Postgraduate Year (PGY)

Table 6. Perceptions of the availability and value of career mentors

Mentor Experience	Total Residents (n=201)
Identified Career Mentor	140 (70%)
Value having a Career Mentor	173 (86%)
Frequency of Meeting Career Mentor	
<1x per year	1 (1%)
1x per year	12 (6%)
2x per year	57 (28%)
>2x per year	63 (31%)

Data is presented as total respondents with percentages in parentheses.

Abbreviation: Curriculum Vitae (CV)

Table 7. Perceptions of the availability and value of mentorship experiences

Mentorship Experiences	Perception of Availability (n=201)	Strongly Value (n=201)
Received Guidance on		
Applying to Fellowship	152 (76%)	112 (56%)
Applying to Academic Practices	121 (60%)	105 (52%)
Applying to Non-academic Practices	77 (38%)	90 (45%)
Contract Negotiation	78 (39%)	100 (50%)
CV Preparation	84 (42%)	105 (52%)
Interview Preparation	114 (57%)	106 (52%)
Financial implication of career choice	44 (22%)	77 (38%)
Impact of career choice on personal life	55 (27%)	103 (51%)

Strongly value is defined as rating the guidance “very useful” or “indispensable”. Data is presented as total respondents with percentages in parentheses.

Abbreviation: Curriculum Vitae (CV)

Table 8. Perceptions of and participation in tracks, pathways, and certification programs

Dedicated Programming	Perceived as Available (n=201)	Joined (n=201)
Primary Care	105 (52%)	26 (13%)
Community Health	22 (11%)	2 (1%)
Global Health	97 (48%)	7 (3%)
Research	85 (42%)	20 (10%)
Leadership and/or Management	43 (21%)	10 (5%)
Education	74 (37%)	7 (3%)

Data is presented as total respondents with percentages in parentheses.

Table 9. Perceptions of the usefulness of available tracks, pathways, and certification programs among participants

Dedicated Programming	Strongly Valued Opportunity
Primary Care	19/26 (73%)
Community Health	1/2 (50%)
Global Health	5/7 (71%)
Research	11/20 (55%)
Leadership and/or Management	3/10 (30%)
Education	6/7 (86%)

Strongly valued is defined as rating the item as “very useful” or “indispensable”. Data is presented of total respondents who rated the program very strongly divided by total who joined with percentages in parentheses.

Table 10. Perceptions of the availability and value of research supports

Research Supports	Perception of Availability (n=201)	Strongly Value (n=201)
Dedicated Research Time	153 (76%)	125 (62%)
Time Available		
<1 month	22 (10%)	
1-2 months	87 (43%)	
>2 months	42 (21%)	
Research Year	78 (39%)	
Research Funds	89 (44%)	100 (50%)

Strongly valued is defined as rating the item as “very useful” or “indispensable”. Data is presented of total respondents with percentages in parentheses.

Table 11. Post-Residency Plans at the Beginning of Residency by Gender

Plans	Male (n=113)	Female (n=88)	p-value
Clinical Fellowship	90 (80%)	59 (67%)	p=0.04
Hospitalist Medicine	9 (8%)	12 (14%)	p=0.19
Plan to Pursue Fellowship Later	6 (5%)	8 (9%)	p=0.30
No Plans to Pursue Fellowship	3 (3%)	4 (5%)	p=0.47
Primary Care Medicine	7 (6%)	12 (14%)	p=0.07
Non-clinical Fellowship or Research	5 (4%)	3 (3%)	p=0.71
Opportunity Apart from Clinical Practice	2 (2%)	2 (2%)	p=0.080
Medical Practice outside the US	–	–	–

Data presented as total respondents for each gender with percentages in parentheses.

Table 12. Fellowships residents intended to pursue at the beginning of residency by gender

Specialty	Male (n=113)	Female (n=88)	p-value
Cardiology	32 (28%)	10 (11%)	p<0.01
Pulmonary and/or Critical Care	13 (12%)	10 (11%)	p=0.95
Hematology and/or Oncology	18 (16%)	13 (15%)	p=0.92
Gastroenterology	5 (4%)	8 (9%)	p=0.18
Nephrology	5 (4%)	2 (2%)	p=0.41
Endocrinology	1 (1%)	4 (4%)	p=0.10
Infectious Disease	7 (6%)	7 (8%)	p=0.63
Rheumatology	3 (3%)	4 (4%)	p=0.47
Geriatrics	1 (1%)	0 (0%)	p=0.38
Undecided	6 (5%)	9 (10%)	p=0.11
Other	5 (4%)	0 (0%)	p=0.05

Data presented as total respondents for each gender with percentages in parentheses.

Table 13. Fellowships residents intended to pursue at the end of residency by gender

Specialty	Male (n=113)	Female (n=88)	p-value
Cardiology	30 (27%)	12 (14%)	p=0.03
Pulmonary and/or Critical Care	12 (11%)	8 (9%)	p=0.72
Hematology and/or Oncology	14 (12%)	12 (14%)	p=0.79
Gastroenterology	5 (4%)	8 (9%)	p=0.18
Nephrology	4 (4%)	2 (2%)	p=0.60
Endocrinology	3 (3%)	3 (3%)	p=0.76
Infectious Disease	8 (7%)	10 (11%)	p=0.29
Rheumatology	1 (1%)	7 (8%)	p=0.01
Geriatrics	1 (1%)	1 (1%)	p=0.86
Undecided	5 (4%)	3 (2%)	p=0.97
Other	4 (4%)	4 (5%)	p=0.72

Data presented as total respondents for each gender with percentages in parentheses.

Table 14. Perceptions of the availability and value of career mentors by gender

Mentor Experience	Male (n=113)	Female (n=88)	p-value
Identified career mentor	73 (65%)	67(76%)	p=0.08
Values career mentor	98 (87%)	75 (85%)	p=0.58
Met mentor \geq 2x per year	63/73 (86%)	57/67 (85%)	p=0.94

Data for identified career mentor and values career mentor is presented of total respondents while data for met mentor is presented as total respondents divided by total who identified a career mentor by gender. Percentages appear in parentheses.

Table 15. Perceptions of the availability of mentorship experiences by gender

Mentorship Guidance	Male (n=113)	Female (n=88)	p-value
Applying to Fellowships	86 (80%)	66 (79%)	p=0.76
Applying to Academic Practices	76 (71%)	45 (54%)	p=0.01
Applying to Non-academic Practices	50 (47%)	27 (32%)	p=0.04
Contract Negotiation	46 (43%)	32 (38%)	p=0.49
CV Preparation	46 (43%)	37 (45%)	p=0.75
Interview Preparation	63 (59%)	51 (61%)	p=0.80
Financial implication of career choice	27 (25%)	17 (20%)	p=0.42
Impact of career choice on personal life	30 (28%)	25 (30%)	p=0.79

Abbreviation: Curriculum Vitae (CV)

Data presented as total respondents for each gender with percentages in parentheses.

Table 16. Perceptions of the value of mentorship experiences by gender

Mentorship Guidance	Male (n=113)	Female (n=88)	p-value
Applying to Fellowship	61 (54%)	51 (58%)	P=0.51
Applying to Academic Practices	55 (49%)	50 (51%)	P=0.73
Applying to Non-academic Practices	51 (45%)	39 (44%)	P=0.91
Contract Negotiation	48 (42%)	52 (59%)	P=0.01
CV Preparation	57 (50%)	48 (55%)	P=0.56
Interview Preparation	54 (48%)	52 (59%)	P=0.11
Financial implication of career choice	41 (36%)	36 (41%)	P=0.50
Impact of career choice on personal life	56 (50%)	47 (53%)	P=0.59

Abbreviation: Curriculum Vitae (CV)

Data presented as total respondents who rated the item as “very useful” or “indispensable” for each gender with percentages in parentheses.

Table 17. Perceptions of the availability of tracks, pathways, and certification programs by gender

Dedicated Programming	Male (n=113)	Female (n=88)	p-value
Community Health	15 (20%)	7 (13%)	p=0.28
Primary Care	55 (75%)	40 (94%)	p<0.01
Global Health	56 (76%)	41 (77%)	p=0.93
Research	49 (67%)	36 (67%)	p=0.93
Leadership and/or Management	30 (41%)	13 (24%)	p=0.05
Education	39 (53%)	35 (66%)	p=0.16
Other	5 (7%)	3 (6%)	p=0.79

Data presented as total respondents for each gender with percentages in parentheses.

Table 18. Perceptions of the usefulness of available tracks, pathways, and certification programs among participants by gender

Dedicated Programming	Male	Female	p-value
Community Health	1/1 (100%)	0/1 (0%)	p=0.16
Primary Care	11/15 (73%)	8/10 (80%)	p=0.91
Global Health	3/3 (100%)	2/4 (50%)	p=0.12
Research	9/12 (75%)	2 (25%)	p=0.03
Leadership and/or Management	3 (38%)	0/2 (0%)	p=0.30
Education	2/2 (100%)	4/5 (80%)	p=0.35
Other	2/3 (67%)	1/1 (100%)	p=0.14

Data presented as total respondents divided by the total participates for each gender with percentages in parentheses.

Table 19. Perceptions of the availability research support by gender

Research Supports	Male (n=113)	Female (n=88)	p-value
Dedicated Research Time	90 (80%)	63 (71%)	P=0.18
Reported ≥ 1 month available	75 (66%)	54 (61%)	p=0.67
Research Year	50 (44%)	28 (32%)	p=0.07
Research Funds	60 (58%)	29 (38%)	p<0.01

Data presented as total respondents for each gender with percentages in parentheses.

Table 20. Post-residency plans at the beginning of residency by interest in academic medicine

Plans	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Clinical Fellowship	76 (72%)	73 (76%)	p=0.44
Hospitalist Medicine	13 (12%)	7 (7%)	p=0.23
Plan to Pursue Fellowship Later	11 (10%)	3 (3%)	p=0.04
No Plans to Pursue Fellowship	3 (3%)	4 (4%)	p=0.61
Primary Care Medicine	11 (10%)	8 (8%)	p=0.60
Non-clinical Fellowship or Research	1 (1%)	3 (3%)	p=0.27
Opportunity Apart from Clinical Practice	3 (2%)	5 (5%)	p=0.39
Medical Practice outside the US	–	–	–

Data presented as total respondents for those who did and those who did not report a strong interest in a career in academic medicine. Percentages are in parentheses.

Table 21. Post-residency plans at the end of residency by interest in academic medicine

Plans	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Clinical Fellowship	61 (58%)	57 (59%)	p=0.85
Hospitalist Medicine	37 (35%)	22 (23%)	p=0.05
Plan to Pursue Fellowship Later	29 (28%)	11 (11%)	p<0.01
No Plans to Pursue Fellowship	8 (8%)	11 (11%)	p=0.35
Primary Care Medicine	9 (8%)	13 (13%)	p=0.26
Non-clinical Fellowship or Research	5 (5%)	3 (3%)	p=0.39
Opportunity Apart from Clinical Practice	10 (10%)	5 (5%)	p=0.25
Medical Practice outside the US	0 (0%)	1 (1%)	p=0.29

Data presented as total respondents for those who did and those who did not report a strong interest in a career in academic medicine. Percentages are in parentheses.

Supplemental Table G. Fellowships residents intended to pursue a at the beginning of residency by Interest in academic medicine

Specialty	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Cardiology	24 (28%)	18 (24%)	p=0.43
Pulmonary and/or Critical Care	8 (10%)	15 (20%)	p=0.07
Hematology and/or Oncology	21 (24%)	10 (13%)	p=0.06
Gastroenterology	8 (9%)	5 (6%)	p=0.49
Nephrology	4 (5%)	3 (4%)	p=0.79
Endocrinology	3 (3%)	2 (3%)	p=0.73
Infectious Disease	6 (7%)	8 (11%)	p=0.47
Rheumatology	4 (5%)	3 (4%)	p=0.79
Geriatrics	0 (0%)	1 (1%)	p=0.29
Undecided	8 (9%)	7 (9%)	p=0.93
Other	1 (1%)	4 (5%)	p=0.14

Data presented as total respondents for those who did and those who did not report a strong interest in a career in academic medicine. Percentages are in parentheses.

Table 22. Fellowships Residents Intended to Pursue (End of Residency) by Interest in Academic Medicine

Specialty	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Cardiology	22 (21%)	20 (21%)	p=0.93
Pulmonary and/or Critical Care	10 (10%)	10 (10%)	p=0.81
Hematology and/or Oncology	19 (18%)	7 (7%)	p=0.02
Gastroenterology	8 (8%)	5 (5%)	p=0.49
Nephrology	3 (3%)	3 (3%)	p=0.91
Endocrinology	3 (3%)	3 (3%)	p=0.92
Infectious Disease	9 (9%)	9 (9%)	p=0.84
Rheumatology	4 (4%)	4 (4%)	p=0.90
Geriatrics	1 (1%)	1 (1%)	p=0.95
Undecided	3 (3%)	4 (4%)	p=0.66
Other	6 (6%)	2 (2%)	p=0.14

Data presented as total respondents for those who did and those who did not report a strong interest in a career in academic medicine. Percentages are in parentheses.

Table 23. Perceptions Availability and Value of Career Mentors by Interest in Academic Medicine

Mentor Experience	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Identified Career Mentor	77 (73%)	56 (58%)	p=0.02
Value Career Mentor	95 (90%)	78 (81%)	p=0.06
Meet ≥2x per year	70/77 (91%)	50/56 (89%)	p=0.03

Data for identified and valued career mentor presented as total respondents for those who did and those who did not report a strong interest in a career in academic medicine. Data for meeting presented as total respondents divided by total who identified a mentor. Percentages are in parentheses.

Table 24. Perceptions about the value of mentorship experiences by interest in academic medicine

Mentorship Guidance	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Applying to Fellowship	83 (79%)	29 (30%)	p<0.01
Applying to non-academic Practices	73 (70%)	17 (17%)	p<0.01
Contract Negotiation	69 (66%)	31 (32%)	p<0.01
CV Preparation	71 (68%)	34 (34%)	p<0.01
Interview Preparation	74 (70%)	32 (33%)	p<0.01
Financial implication of career choice	51 (48%)	26 (27%)	p<0.01
Impact of career choice on personal life	67 (64%)	36 (34%)	p<0.01

Data presented as total respondents who rated the item as “very useful” or “indispensable” for those who did and those who did not report a strong interest in a career in academic medicine. Percentages are in parentheses. Abbreviation: Curriculum Vitae (CV)

Table 25. Perceptions of the availability research support by interest in academic medicine

Research Supports	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Dedicated Research Time	84 (80%)	69 (84%)	p=0.55
Reported ≥ 1 month available	72 (69%)	57 (59%)	p=0.17
Research Year	46 (45%)	32 (41%)	p=0.63
Research Funds	47 (47%)	42 (53%)	p=0.38

Data presented as total respondents for those who did and those who did not report a strong interest in a career in academic medicine. Percentages are in parentheses.

Table 26. Perceptions of the value of research supports by interest in academic medicine

Research Supports	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Dedicated Research Time	78 (75%)	47 (49%)	p<0.01
Research Funds	62 (59%)	38 (40%)	p<0.01

Data presented as total respondents who rated the item as “very useful” or “indispensable” for those who did and those who did not report a strong interest in a career in academic medicine. Percentages are in parentheses.

Table 27. Availability of Clinical Experiences Reported by Program Directors

Clinical Electives	Programs (n=8)
Availability of Clinical Elective Time	
PGY-1	6
PGY-2	8
PGY-3	8
Availability of Clinical Setting	
Inpatient	8
Outpatient	8
Rural	5
Urban	5
Global Health	8
External	8
Sufficiency of Elective Time	
Inadequate	3
Sufficient	5
Excessive	0
External Electives Critical for Developing Post-Residency Plans	6

Data presented as total number of programs directors.

Abbreviation: Postgraduate Year (PGY)

Table 28. Availability of career mentors reported by program directors

Mentor Experiences	Programs (n=8)
Assigned Mentor	8
Frequency of Meeting Career Mentor	
<1x per year	0
1x per year	2
2x per year	4
>2x per year	2

Data presented as total number of programs directors.

Abbreviation: Curriculum Vitae (CV)

Table 29. Availability and value of mentorship experiences reported by program directors

Mentorship Guidance	Availability (n=8)	Strongly Value (n=8)
Applying to Fellowship	7	6
Applying to Academic Practices	7	3
Applying to Non-academic Practices	5	2
Contract Negotiation	5	2
CV Preparation	6	2
Interview Preparation	7	5
Financial implication of career choice	4	1
Impact of career choice on personal life	6	1

Strongly value is defined as a select of “very useful” for or indispensable to the development of post-residency plan for each item. Data presented as total number of programs directors.

Abbreviation: Curriculum Vitae (CV)

Table 30. Availability of tracks, pathways, and certification programs reported by program directors

Dedicated Program	Available (n=8)
Primary Care	5
Community Health	0
Global Health	4
Research	4
Leadership and/or Management	1
Education	3

Data presented as total number of programs directors.

Table 31. Availability of research support reported by program directors

Research Supports	Programs (n=8)
Dedicated Research Time	7
Time Available	
<1 month	1/7
1-2 months	2/7
>2 months	4/7
Research Year	5
Research Funds	5

Data presented as total number of programs directors.
 Time available for research presented as total number divided by the 7 programs that offered research.

Appendix

Supplemental Table A. Relative popularity of fellowships among residents pursuing fellowships

Specialty	Beginning of Residency (n=149)	End of Residency (n=118)	p-value
Cardiology	38 (26%)	35 (30%)	p=0.55
Pulmonary and/or Critical Care	22 (15%)	17 (14%)	p=0.93
Hematology and/or Oncology	29 (19%)	20 (17%)	p=0.60
Gastroenterology	12 (8%)	8 (7%)	p=0.70
Nephrology	7 (5%)	5 (4%)	p=0.86
Endocrinology	5 (3%)	5 (4%)	p=0.76
Infectious Disease	10 (7%)	11 (9%)	p=0.41
Rheumatology	7 (5%)	7 (6%)	p=0.65
Geriatrics	1 (1%)	2 (2%)	p=0.43
Undecided	14 (9%)	2 (2%)	p<0.01
Other	4 (3%)	6 (5%)	p=0.31

Data is presented as total respondents with percentages in parentheses.

Supplemental Table B. Baseline characteristics and perceptions of residents by gender

Characteristics/Perceptions	Male (n=113)	Female (n=88)	p-value
Completed a Non-MD Degree Before Residency	35 (31%)	27 (31%)	p=0.97
Doctoral Degree	10 (8%)	8 (9%)	p=0.95
Master's Degree	25 (23%)	19 (22%)	p=0.94
Prepared to practice in GIM After Residency			p=0.68
Not at all	2 (2%)	3 (3%)	
Mildly or Moderately	52 (46%)	37 (42%)	
Very or Completely	59 (52%)	47 (53%)	
Strong Interest in Academic Career After Residency	55 (53%)	60 (62%)	p=0.26

Data presented as total respondents for each gender with percentages in parentheses.

Abbreviation: GIM (General Internal Medicine)

Supplemental Table C. Post-residency plans at the end of residency by gender

Plans	Male (n=113)	Female (n=88)	p-value
Clinical Fellowship	70 (62%)	48 (54%)	p=0.29
Hospitalist Medicine	33 (29%)	26 (30%)	p=0.98
Plan to Pursue Fellowship Later	19 (17%)	21 (24%)	p=0.21
No Plans to Pursue Fellowship	14 (12%)	5 (6%)	p=0.10
Primary Care Medicine	13 (12%)	9 (10%)	p=0.77
Non-clinical Fellowship or Research	5 (4%)	3 (3%)	p=0.72
Opportunity Apart from Clinical Practice	7 (6%)	8(9%)	p=0.44
Medical Practice outside the US	1 (1%)	0 (0%)	p=0.38

Data presented as total respondents for each gender with percentages in parentheses.

Supplemental Table D. Participation in available tracks, pathways, and certification programs by gender

Dedicated Programming	Male (n=113)	Female (n=88)	p-value
Community Health	1 (1%)	1 (1%)	p=0.60
Primary Care	15 (13%)	11 (13%)	p=0.98
Global Health	3 (3%)	4 (5%)	p=0.41
Research	12 (11%)	8 (9%)	p=0.84
Leadership and/or Management	8 (7%)	2 (3%)	p=0.42
Education	2 (2%)	5 (6%)	p=0.11
Other	3 (3%)	1 (1%)	p=0.47

Data presented as total respondents for each gender with percentages in parentheses.

Supplemental Table E. Perceptions of the value of research support by gender

Research Supports	Male (n=113)	Female (n=88)	p-value
Dedicated Research Time	70 (61%)	55 (63%)	p=0.81
Research Funds	59 (52%)	41 (47%)	p=0.60

Data presented as total respondents who rated the item as “very useful” or “indispensable” for each gender with percentages in parentheses.

Supplemental Table F. Baseline characteristics and perceptions of residents by interest in Academic Medicine

Characteristics/Perceptions	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Completed a Non-MD Degree Before Residency	36 (34%)	23 (27%)	p=0.27
Doctoral Degree	11 (10%)	5 (5%)	p=0.17
Master's Degree	25 (24%)	18 (19%)	p=0.38
Prepared to practice in GIM After Residency			p=0.39
Not at all	4 (4%)	1 (1%)	
Mildly or Moderately	44 (42%)	45 (47%)	
Very or Completely	57 (54%)	50 (42%)	

Data presented as total respondents for each gender with percentages in parentheses.

Abbreviation: GIM (General Internal Medicine)

Supplemental Table H. Perceptions of the Availability of Mentorship Experiences by Interest in Academic Medicine

Mentorship Guidance	Strong Interest (n=105)	Not Strong Interest (n=96)	p-value
Applying to Fellowship	78 (74%)	74 (86%)	p=0.13
Applying to Academic Practices	61 (58%)	60 (69%)	p=0.10
Applying to Non-academic Practices	44 (41%)	33 (38%)	p=0.62
Contract Negotiation	41 (39%)	37 (43%)	p=0.58
CV Preparation	51 (49%)	33 (38%)	p=0.16
Interview Preparation	63 (60%)	51 (59%)	p=0.92
Financial implication of career choice	23 (22%)	21 (24%)	p=0.68
Impact of career choice on personal life	32 (30%)	23 (27%)	p=0.57

Data presented as total respondents for those who did and those who did not report a strong interest in a career in academic medicine.

Abbreviation: Curriculum Vitae (CV)

Appendix A: Resident Survey

Thank you for completing this survey: It should take less than 10 minutes to complete.

Your responses will improve our understanding of career planning resources for residents, how useful these are, and what additional resources could be helpful. Surveys will be received anonymously, with no possibility of your responses being associated with your name.

1. Gender
 - Male
 - Female
 - Other
 - Prefer not to answer

2. Have you completed a graduate degree other than a medical degree (e.g. JD, Masters, etc)?
 - Yes (**Proceed to “If Yes” [2a]**)
 - No

If Yes

2a. What other graduate degree(s) do you have? (*check any/all that apply*)

- Doctoral degree in science or engineering
- Doctoral degree in another field
- Masters in a science field
- Masters in Education
- Masters of Business Administration
- Masters of Public Health
- Other: _____

2b. When did you complete your non-MD graduate degrees?

- Before Medical School
- During Medical School
- After Medical School

3. **At the time you entered residency**, what did you intend to do (or think you might do) **immediately** after completing residency? (Please select one best response)

- Clinical fellowship (**Proceed to “If Clinical fellowship” [3a]**)
- Non-clinical fellowship or research program
- Practice as a hospitalist in the US
- Practice primary care in the US
- Practice as a physician abroad
- Leave medicine to pursue a different path (**Proceed to “Leave fellowship” [3b]**)

**If Clinical
fellowship**

3a. What clinical specialty area did you intend to pursue?

- Cardiology
- Endocrinology
- Gastroenterology
- Geriatrics
- Hematology/oncology
- Infectious diseases
- Nephrology
- Pulmonary/critical care
- Rheumatology
- Undecided specialty
- Other specialty: _____

**If Leave
medicine**

3b. Please describe what you intended to do next.

4. **As of now**, what will you be doing **immediately** after completing residency training?

- Clinical fellowship (**Proceed to “If Clinical fellowship” [4a]**)
- Non-clinical fellowship or research program
- Practice as a hospitalist in the US
- Practice primary care in the US
- Practice as a physician abroad
- Leave medicine to pursue a different path (**Proceed to “Leave fellowship” [4b]**)

**If Clinical
fellowship**

4a. What clinical subspecialty will you pursue?

- Cardiology
- Endocrinology
- Gastroenterology
- Geriatrics
- Hematology/oncology
- Infectious diseases
- Nephrology
- Pulmonary/critical care
- Rheumatology
- Undecided specialty
- Other specialty: _____

**If “Leave
medicine”**

4b. Please describe what you intended to do next.

5. Please rate your current preparedness for independent practice.
 - Not at all prepared
 - A little prepared
 - Moderately prepared
 - Very prepared
 - Completely prepared

6. Do you have a strong interest in pursuing a career in academic medicine?
 - Yes
 - No

7. Were you able to choose one or more elective rotations during your residency?
 - Yes (**Proceed to "If Yes" [6a]**)
 - No (**Proceed to "If No" [6h]**)

**If
Yes**

- 7a. In which years were you allowed to select clinical electives? (Please select ALL that apply)
 - PGY-1
 - PGY-2
 - PGY-3

- 7b. What type(s) of elective rotations were offered by your program? (Check all that apply)
 - Inpatient
 - Outpatient
 - Research
 - Global Health
 - Rural
 - Other: _____

- 7c. Please list any additional elective experiences that your program or institution provided that aided your exploration of your post-residency opportunities.

- 7d. Does your program allow residents to pursue "external" electives - i.e. at institutions not affiliated with your residency?
 - Yes
 - No

- 7e. Please rate your agreement with the following statement: *"The ability to pursue an elective at an external institution is helpful for developing post-residency plans?"*
 - Strongly Agree
 - Agree
 - Neither Agree nor Disagree
 - Disagree
 - Strongly Disagree

7f. Please rate your agreement with the following statement: *“For presentations that I was required to give at rounds or conferences, I was given flexibility in choosing topics that allowed me to explore or develop potential career interests.”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

7g. How would you rate *the amount of elective time offered?*

- Too much
- Adequate
- Insufficient

**If
No**

7h. Please rate your agreement with the following statement: *“Having elective time during residency would have helped me in developing my post-residency plans.”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

7i. In which year would elective time best help you develop post-residency plans? (Check one)

- PGY-1
- PGY-2
- PGY-3

7j. Please rate your agreement with the following statement: *“The ability to pursue an elective at an external institution is useful in developing post-residency plans.”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

8. Did you have a mentor during your residency who played a major role in helping you develop your post-residency plans?

- Yes (**Proceed to “If Yes” [7a]**)
- No

If Yes

8a. On average, how often did you meet with your mentor during residency?

- Less once a year
- One a year
- Twice a year
- More than twice a year

9. Please rate your agreement with the following statement: *“Having an identified mentor is useful in developing post-residency plans.”*

- Strongly Agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly Disagree

10. Please identify the resources that were available to you based on the following statements. ***“My residency program or teaching hospital offered guidance on...***

	Yes	No	Unsure
...the fellowship application process."			
...applying for positions in academic medical centers."			
...applying for non-academic practice-based positions."			
...negotiation skills."			
...CV development."			
...interview preparation."			
...the financial implications of career choices."			
...the impact of different career choices on my personal life."			

11. For those item(s) where you selected “yes” in question 9, please **rate the usefulness of each of these resources in helping you** develop your post-residency plans.

	Not useful	A Little Useful	Moderately Useful	Very Useful	Indispensable
Guidance on the fellowship application process.					
Guidance on applying for positions in academic medical centers.					
Guidance on applying for non-academic practice-based positions.					
Guidance on negotiation skills.					
Guidance on CV development.					
Guidance on interview preparation.					
Guidance related to the financial implications of career choices.					
Guidance related to the impact of different career choices on my personal life.					

12. For those item(s) where you selected “no” or “unsure” in question 9, please **rate how useful you believe the following experiences *would be*** in helping residents develop their post-residency plans.

	Not useful	A Little Useful	Moderately Useful	Very Useful	Indispensable
Guidance on the fellowship application process.					
Guidance on applying for positions in academic medical centers.					
Guidance on applying for non-academic practice-based positions.					
Guidance on negotiation skills.					
Guidance on CV development.					
Guidance on interview preparation.					
Guidance related to the financial implications of career choices.					
Guidance related to the impact of different career choices on my personal life.					

13. Did your residency program or teaching hospital offer dedicated tracks, concentrations, or certificate programs (e.g. in areas such as research, global health, medical education, etc.)?

- Yes (**Proceed to “If Yes” [12a]**)
- No (**Proceed to “If Yes” [12d]**)

If Yes

13a. Which tracks or concentrations were available to you during residency? (check any/all that apply)

- Research
- Education
- Global Health
- Leadership/Management
- Primary Care
- Public/Community Health
- Other: _____

13b. Which of the following did you join? (check any/all that apply) If none apply, please leave this question blank.

- Research
- Education
- Global Health
- Leadership/Management
- Primary Care
- Public/Community Health
- Other: _____

13c. Please **rate the usefulness** of the following tracks, concentrations or certificate programs in helping you develop post-residency plans. **Please only rate the ones you joined.**

Not useful A little Useful Moderately Useful Very Useful Indispensable

Research					
Education					
Global Health					
Leadership/Management					
Primary Care					
Public/Community Health					
Other: _____					

If No

13d. Please rate your agreement with the following statement: *“Dedicated tracks, concentrations or certificate programs (e.g. research, global health, medical education, etc.) are useful for helping residents make post-residency plans.”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

14. Does your program allow residents to have dedicated research time **within** the three-year residency?

- Yes (**Proceed to “If Yes” [13a]**)
- No

If Yes

14a. How much time did your residency allow you to dedicate to research?

- Less than 1 Month
- 1-2 Months
- 3-6 Months
- >6 months

15. Does your program allow residents to take a year (or some other amount of time) to step out of required resident activities or add on time to the residency to pursue research or other career-related activities?

- Yes
- No
- Unsure

16. Does your program OR institution provide funding for residents to pursue independent projects?

- Yes
- No
- Unsure

17. Please **rate the usefulness of following resources in helping residents** develop post-residency plans.

	Not useful	A Little Useful	Moderately Useful	Very Useful	Indispensable
Dedicated research time					
Funding for independent projects					

18. Please list additional resources or supports that were NOT provided but would have been helpful in post-residency career planning.

Appendix B: Program Director and Designated Institutional Official (DIO) Survey

Dear Program Directors and DIOs,

Thank you for completing this survey: It should take less than 10 minutes to complete. Your responses will improve our understanding of career planning resources for residents, how useful these are, and what additional resources could be helpful. Surveys will be received anonymously, with no possibility of your responses being associated with your name.

1. Does your program allow residents to choose one or more elective rotations?

- Yes (**Proceed to “If Yes” [1a]**)
- No (**Proceed to “If No” [1h]**)

If Yes

1a. How many weeks of elective rotations do residents have each year?

- PGY-1 _____ weeks
- PGY-2 _____ weeks
- PGY-3 _____ weeks

1b. What type of elective rotations are offered by your program? (check all that apply)

- Inpatient
- Outpatient
- Research
- Global Health
- Rural
- Other: _____

1c. Please list any additional elective experiences that your residency provides that aids residents' exploration of their post-residency opportunities.

1d. Does your program allow residents to pursue electives at external institutions not affiliated with your residency?

- Yes
- No

1e. Please rate your agreement with the following statement: *“The ability to pursue an elective at an external institution is useful for helping residents develop post-residency plans?”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

1f. Please rate your agreement with the following statement: *“For presentations that residents are required to give at rounds or conferences, they are given flexibility in choosing topics that allowed them to explore or develop their potential career interests.”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

1g. How would you rate the amount of elective time offered by your program?

- Too much elective time offered
- Adequate elective time offered
- Insufficient elective time offered

If No

1h. Please rate your agreement with the following statement: *“Having elective time during residency would help residents in developing their post-residency plans.”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

1i. In which year would elective time best help residents develop post-residency career plans? (Check one only)

- PGY-1
- PGY-2
- PGY-3

1j. Please rate your agreement with the following statement: *“The ability to pursue an elective at an external institution is useful for helping residents develop post-residency career plans?”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

2. Are residents in your program assigned an individual mentor?

- Yes (**Proceed to “If Yes” [2a]**)
- No

If Yes

2a. On average, how often do you believe residents meet with their mentor during residency?

- Less once a year
- One a year
- Twice a year
- More than twice a year

3. Please rate your agreement with the following statement: *“Having a formal mentor assigned to residents is useful for helping them develop post-residency plans.”*

- Strongly Agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly Disagree

4. Please identify the resources that were available to residents based on the following statements. **“My residency program or teaching hospital offered guidance on...**

	Yes	No
...the fellowship application process."		
...applying for positions in academic medical centers."		
...applying for non-academic practice-based positions."		
...negotiation skills."		
...CV development."		
...interview preparation."		
...the financial implications of career choices."		
...the impact of different career choices on residents' personal lives."		

5. For those item(s) where you selected “yes” in question 4, please **rate the usefulness of each of these resources in helping residents** develop their post-residency plans.

	Not useful	A Little Useful	Moderately Useful	Very Useful	Indispensable
Guidance on the fellowship application process.					
Guidance on applying for positions in academic medical centers.					
Guidance on applying for non-academic practice-based positions.					
Guidance on negotiation skills.					
Guidance on CV development.					
Guidance on interview preparation.					
Guidance related to the financial implications of career choices.					
Guidance related to the impact of different career choices on residents' personal lives.					

6. For those item(s) where you selected “no” in question 4, please **rate how useful you believe the following experiences would be** in helping residents develop their post-residency plans.

	Not useful	A Little Useful	Moderately Useful	Very Useful	Indispensable
Guidance on the fellowship application process.					
Guidance on applying for positions in academic medical centers.					
Guidance on applying for non-academic practice-based positions.					
Guidance on negotiation skills.					
Guidance on CV development.					
Guidance on interview preparation.					
Guidance related to the financial implications of career choices.					
Guidance related to the impact of different career choices on residents' personal lives.					

7. Does your residency program or teaching hospital offer dedicated tracks, concentrations, or certificate programs (e.g. in areas such as research, global health, medical education, etc.)?

- Yes (**Proceed to “If Yes” [7a]**)
- No (**Proceed to “If Yes” [7d]**)

If Yes

7a. Which tracks or concentrations are available to your residents? (check any/all that apply)

- Basic Science Research
- Education
- Global Health
- Leadership/Management
- Primary Care
- Public/Community Health
- Other: _____

7b. Who administers the available tracks?

	Hospital	Your Residency Program	Other
Primary Care			
Public/Community Health			
Global Health			
Basic Science Research			
Leadership/Management			
Education			
Other: _____			

7c. Please **rate the usefulness** of the following tracks to residents in developing their post-residency career plans

Not useful A little Useful Moderately Useful Very Useful Indispensable

	Not useful	A little Useful	Moderately Useful	Very Useful	Indispensable
Primary Care					
Public/Community Health					
Global Health					
Basic Science research					
Leadership/Management					
Education					
Other: _____					

If No

7d. Please rate your agreement with the following statement: *“Dedicated tracks, concentrations, or certificate programs (e.g. research, global health, medical education, etc.) are useful for helping residents make post-residency plans.”*

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

8. Does your program allow residents to have dedicated research time **within** the three-year *residency*?
- Yes (**Proceed to “If Yes” [8a]**)
 - No

If Yes

8a. How much time does your residency allow residents to dedicate to research?

- Less than 1 Month
- 1-2 Months
- 3-6 Months
- >6 months

9. Does your program allow residents to take a year (or some other amount of time) to step out of required resident activities or add-on time to the residency to pursue research or other career-related activities?
- Yes
 - No
10. Does your program OR institution provide funding for residents to pursue independent projects?
- Yes
 - No

11. Please **rate the usefulness of following resources in helping residents** develop post-residency plans.

	Not useful	A Little Useful	Moderately Useful	Very Useful	Indispensable
Dedicated research time					
Funding for independent projects					

12. Please list additional resources or supports that are NOT provided but would have been useful in helping develop post-residency career plans.

Appendix C. Program Director: Semi-Structured Interview Guide

Thank you for completing the survey and agreeing to complete this interview. The interview is intended to explore barriers to providing support for residents in developing post-residency plans.

Interview Questions

Question 1: How does your program currently support residents in developing their plans after residency?

Question 2: Can you give an example of programming related to post-residency

Question 3: How do you think this programming would have helped residents?

Question 4: What barriers have you faced with developing this programming?

Question 5: What are the major challenges your residency program faces today with supporting residents in developing post-residency plans?

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