


SPECIAL REPORT

The American Society of Pediatric Hematology Oncology workforce, productivity, and fellowship assessment: Current state of the workforce

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on behalf of the American Society of Pediatric Hematology Oncology Workforce Publication
Workgroup

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Abstract

The American Society of Pediatric Hematology Oncology conducted follow-up workforce surveys in 2017 and 2021 as well as a Pediatric Hematology Oncology Fellowship Program Directors Survey in 2020 to provide an updated review of the current workforce. We provide a comprehensive review and analysis of these results with the goal to provide better understanding of the current landscape in pediatric hematology oncology.

KEYWORDS

ASPHO, fellowship, workforce

1 | INTRODUCTION

The American Society of Pediatric Hematology Oncology (ASPHO) periodically collects data to inform its members on the current state

of the workforce as well as the outcome of fellowship graduates in the specialty. A workforce assessment published in 2018 encompassed data from a variety of ASPHO surveys (2010–2015) and highlighted several key findings in the changing workforce at that time.¹ A significant increase in the proportion of women to men was noted over the prior two decades, with a similar shift seen in general pediatrics and other pediatric sub-specialties.^{2–4} Many of these pediatric hematology oncology (PHO) physicians (80%) worked in academic medical centers or hospital-based practices with a trend toward sub-specialization with

Abbreviations: ABP, American Board of Pediatrics; ACGME, American College of Graduate Medical Education; APPs, advanced practice providers; ASPHO, American Society of Pediatric Hematology Oncology; cFTE, clinical full-time equivalent; FTE, full-time equivalent; HSCT, hematopoietic stem cell transplantation; MIBG, meta-iodobenzylguanidine; PHO, pediatric hematology oncology; wRVU, work relative value units.

the development of highly focused disease-based teams. An increased proportion of the clinical work was being performed by advanced practice providers (APPs) as well as by hospitalists (some of whom were PHO trained) though data on this contribution to the PHO workforce were limited in the survey. Disparities were noted in the physician-to-child ratio in the rural versus major metropolitan areas, consistent with most providers practicing in larger academic centers. Ethnic diversity among providers was limited, especially when compared to the patient population.

A companion fellowship employment survey was published in 2018 and noted that the number of PHO subspecialty trainees more than doubled in the prior 12 years.⁵ This larger number of fellows in training was anticipated to have a significant impact on the future workforce.

ASPHO conducted a subsequent PHO workforce survey in 2017, and more recently in 2021, to determine how changes in the PHO workforce continue to evolve with respect to the graduating fellows, APPs, and hospitalists, as well as changes in demographics in the workforce, locations of practice, job responsibilities, and burnout. A separate survey gathered data on employment for graduating fellows to identify career trajectories. The goal of these surveys is to inform the specialty of the trends in practice and career development to provide guidance to trainees, PHO providers, practices, and hospitals regarding the PHO workforce. The current workforce survey was conducted by a different third-party consultant than the 2017 survey with some variation in questions, potentially challenging direct comparisons. Nevertheless, the data provide valuable perspectives on changes and status of the PHO workforce.

2 | METHODS

In 2021 ASPHO's survey consultant distributed a Workforce and Productivity Survey of 53 questions to 212 division directors in PHO across the U.S. Participating institutions are acknowledged in Table S1. This survey was developed by the ASPHO Workforce Survey Taskforce, an ad hoc workgroup with diversity in practice size and areas of expertise, and with oversight from the ASPHO Practice Committee. This taskforce worked in conjunction with the third-party consultant in survey development. The directors were identified by a program database developed by ASPHO, periodically updated with internet searches and contact with directors at all major medical centers with a PHO program. For the few small programs without an identified director, an ASPHO member was identified and asked to be the lead for their program in submitting the data. The survey was distributed via email by the consultant from October to December 2021. Division directors were asked to complete this survey based on calendar year 2020 data. It was estimated the survey would take 1 h to complete and specific data were asked to be collected in advance by the director and administrative staff. All data were anonymized and could not be traced to any specific institution or director.

The PHO Workforce and Productivity Survey captured data on numerous facets of the PHO workforce including practice size, structure, billing procedures, and workforce composition; how providers

allocate their time and what subspecialties they pursue; workforce growth, turnover, program expansion, and the top factors for hiring new providers; key challenges experienced by practice leaders; and the impact of the COVID-19 pandemic on the workforce.

The ASPHO Training Committee developed a second survey that was distributed to the PHO fellowship program directors, who were identified from the ASPHO database, as well as listings from the American Board of Pediatrics (ABP) and Accreditation Council for Graduate Medical Education (ACGME). The survey was distributed by email to 72 program directors and data was collected between January and July 2021. Follow-up emails and phone calls were used to enhance participation. The purpose of this survey was to assess the employment outcome of PHO fellow graduates.

The ABP publishes pediatric workforce data, including PHO specific data, as well as fellowship match data. We obtained permission from the ABP to cite their data for comparison purposes to the survey results.

3 | RESULTS

3.1 | Workforce and productivity survey

The ASPHO 2017 and 2021 Workforce and Productivity Surveys, each reflecting the prior calendar year, were sent to the division directors of 186 and 212 unique institutions, respectively. Both surveys had similar response rates of 30% (56 out of 186) and 31% (65 out of 212), and 40% of the respondents in 2021 also participated in 2017. Per the 2021 survey report, 1326 providers were represented in the survey (849 PHO physicians, 27 hospitalists, 450 APPs). Of the 1326 providers, 1178 were full-time employees. Participants from the South accounted for the largest proportion of responses at 37% followed by Midwest (29%), West (17%), and Northeast (17%).

3.1.1 | Practice profile

Program size was stratified by the reported number of new oncology patients per year and physician full-time equivalents (FTEs), respectively, as small (<60, 1–3), medium (60–150, 4–10), or large (>150, >10) (Figure 1). For both surveys, medium-sized programs represented the largest portion of survey results (39 and 43%, respectively). However, a greater proportion of small programs rather than large completed the survey in 2021 compared with 2017 (31 vs. 26%). This shift was also reflected in a decrease of mean and median new oncology patients from 2017 to 2021 (from 134 to 110 and 99 to 67, respectively) and fewer respondents with a fellowship training program (68 vs. 48%). Of those providing hematopoietic stem cell transplantation (HSCT), an average of 33 transplants were performed annually. Although the university/academic practice type remained the most common for 2017 (71%), 2020 (57%), and 2015 (63%), there was a larger proportion of respondents in 2021 (38%) from hospital-based practices compared to 2017 (24%) and 2015 (27%).

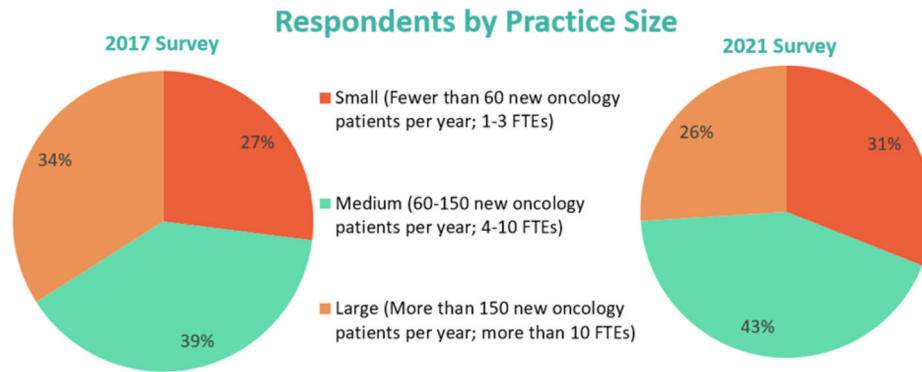


FIGURE 1 Respondents by practice size

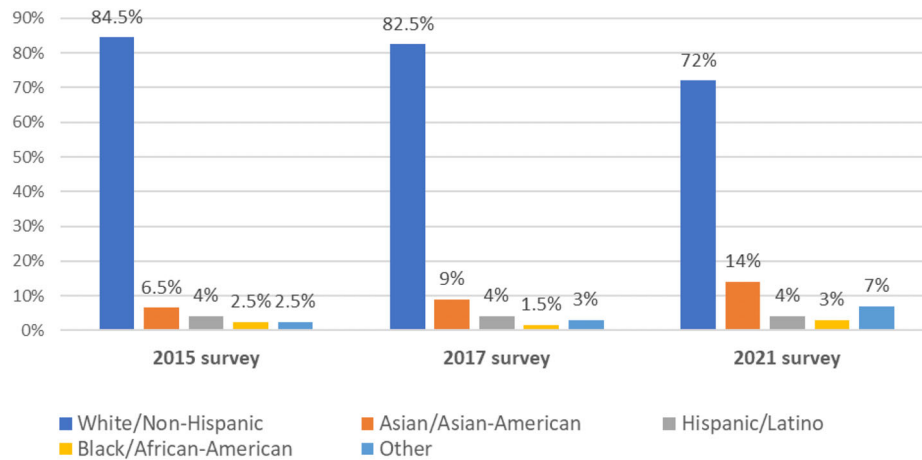


FIGURE 2 Comparison of percentage of all providers (physician, APP, hospitalist) by race and ethnicity per survey year

3.1.2 | Provider demographics

Provider demographics by race and ethnicity for the 2021 survey compared to previous workforce surveys are depicted in Figure 2. Most providers were female (70%) and White/Non-Hispanic (72%). However, the percentage of physicians with an Asian racial/ethnic background increased to 19% in 2021 (compared to 17% in 2017 and 10% in 2015) and the percentage of physicians with a White racial/ethnic background decreased to 67% compared with 74% in 2017 and 78% in 2015. The percentage of APPs with a White racial/ethnic background decreased to 84% compared with 91% from 2017. Racial and ethnic diversity was highest for hospitalists, with 63% of providers reported as White compared with 84% for APPs and 67% for PHO physicians. The percentage of full-time physicians that are female has increased to 50% in 2021, compared with 44% in 2017 and 41% in 2015.

Larger programs employed more APPs than smaller programs. The median program had 0.53 clinical FTE (cFTE) APPs per physician; however, there was a large disparity across practice sizes. The number of cFTE APPs per physician was 0.81, 0.63, and 0.32 in large, medium, and small programs, respectively. The average small program had approximately three PHO physicians and one APP, and the average large program had 32 PHO physicians and 16 APPs. In general,

hospitalists contributed minimally to the PHO workforce. Only 7 institutions reported utilizing hospitalists in their programs. The absolute number of APPs, as a representation of cFTEs, has declined. APPs, as a percentage of APPs and physicians, declined from 43% in 2017 to 37% in 2021. As well, the APP proportion of cFTEs fell from 55% in 2017 to 46% in 2021. It should be noted that this change may be influenced by changes in survey respondents in 2021 compared to the 2017 data, as we noted a shift to more small and medium-sized programs participating in the survey.

APPs see patients independently (always and sometimes) in 95% of programs. The percentage of programs with APPs that always and sometimes bill independently has steadily increased from 62% (2015) to 82% (2017) to 95% (2020). Work relative value units (wRVU) generated by APPs are attributed to physicians only, APPs only, a combination of the two, or another unspecified model in 13, 44, 31, and 13% of programs, respectively.

3.1.3 | Distribution of effort: clinical, research, administrative, teaching

The average clinical time as a percentage of FTE was the highest for hospitalists and APPs at 92 and 91%, respectively, followed by

TABLE 1 Distribution of effort for PHO providers

	Clinical	Teaching	Research	Administration	Other	Total
Clinically focused PHO ^a physicians	75.0%	7.3%	8.9%	7.8%	0.9%	100%
Research-focused PHO ^a physicians	24.1%	5.6%	62.0%	7.4%	0.8%	100%
Hospitalists	91.7%	0.8%	0.8%	6.7%	0.0%	100%
Advanced practice providers	90.6%	2.1%	1.1%	4.7%	1.4%	100%

^aPediatric Hematology Oncology.

TABLE 2 Inpatient service time and wRVU goals for a 1.0 cFTE physician

Year	N	Median	Mean
Inpatient service weeks	2015	64	12
	2017	38	10
	2021	63	12
Individual wRVU ^a goal	2015	21	3550
	2017	22	3550
	2021	41	3000

^aWork relative value units.

clinically focused PHO physicians (whose primary role is clinical care) at 75% and research-focused PHO physicians at 24% (Table 1). Research-focused PHO physicians dedicated 62% effort in conducting research, with 7% of time in administrative tasks; clinically focused PHO physicians spent 24% effort evenly distributed between teaching, research, and administrative tasks.

In-house night call, in general, was provided primarily by pediatric house staff for PHO patients but not consistently for HSCT patients. Hospitalists (inclusive of general pediatrics and PHO fellowship-trained) were utilized in seven institutions.

The clinical productivity of providers was addressed in the survey. The median program individual wRVU goal per physician was 3000. For programs with a group goal, this number was achieved by dividing the total goal by number of cFTEs. The wRVU goals were similar between hematologists (3351) and oncologists (3301) and were highest for medium-sized programs at 3370, followed by 3000 for large programs and 2850 for small programs. These wRVU goals are similar to those previously reported in the 2015 and 2017 surveys (3100–3500).

For a 1.0 cFTE PHO physician, the average number of half-day clinic sessions spent per week was 6.1, and the average number of weeks per year attending on the inpatient service was 14.6. This compares to 5–7 half-day clinic sessions per week and 12 weeks on the inpatient, as previously reported by division directors¹ (Table 2).

3.1.4 | Change in workforce

Program expansion was the most common reason to hire new physicians in 2020, compared with the replacement of staff in 2016. However, the average practice had a net decrease of 0.3 physicians

between January 2018 and December 2020, with an average of 2.61 physicians leaving and 3.8 physicians being hired. Reasons for leaving, according to the division directors, were relocation (28%), retirement (11%), change to pharmaceutical industry (10%), behavior/performance (4%), workplace environment (2%), and change to primary care (1%). Interestingly, 44% left for other reasons not cited.

The average practice had an increase of 0.2 APPs between January 2018 and December 2020 (from 2.7 to 2.9 of APPs that left and were hired, respectively). Primary reasons APPs chose to leave their positions, according to division directors, were relocation (40%), retirement (15%), workplace environment (13%), and other (24%).

3.1.5 | Challenges

The top barrier facing physicians, as reported by the respondents of the 2017 and 2021 surveys, continues to be lack of funding. The top five clinical challenges from the 2021 survey in order of ranking were institutional funding, funding for essential support services inclusive of child life and dieticians, staying up-to-date on expanding medical knowledge in the field, access to new therapies, and access to high-cost/low-volume technology inclusive of proton therapy and therapeutic MIBG. Additional challenges included socioeconomic barriers to access, access to care for patients living at a distance from major medical centers, and drug shortages.

The top five practice or operational challenges from the 2021 survey by ranking were insurance prior authorizations, nonclinical work/administrative tasks, information technology challenges including electronic health records, shortage of research funds and infrastructure, and reduced payments for clinical services. According to respondents, a decrease in funds for nonclinical and scholarly work will continue to grow as a challenge in the future. Telemedicine and patients and families not wanting to attend in-person visits during the pandemic posed unique challenges in the past few years.

Resiliency and burnout were rated as the greatest professional development challenges, followed by continuing medical education needs, professional and leadership training, and maintaining board certification. Respondents reported that the most critical new and future challenges are time and financial support for nonclinical activities, followed by a move to shift-based practice models; diversity, equity, and inclusion efforts; fellowship training models no longer suiting or meeting the needs of newer generations; shifts in payment models; and inadequate support for teaching.

TABLE 3 Fellow graduate employment outcomes 2016–2020

	2016	2017	2018	2019	2020
Subspecialty fellow*	39 (26%)	44 (29%)	42 (27%)	44 (30%)	49 (33%)
Instructor	41 (28%)	44 (29%)	39 (25%)	41 (28%)	27 (18%)
Assistant professor	37 (25%)	42 (27%)	40 (25%)	47 (32%)	44 (30%)
Hospitalist (no academic title)	6 (4%)	4 (3%)	10 (6%)	5 (3%)	4 (3%)
Nonacademic PHO ^a	8 (5%)	10 (6%)	9 (6%)	5 (3%)	11 (7%)
Other specialty	4 (3%)	4 (3%)	7 (4%)	4 (3%)	5 (3%)
Pharmaceutical industry	3 (2%)	3 (3%)	3 (2%)	2 (1%)	5 (3%)
Government	4 (3%)	2 (1%)	3 (2%)	1 (1%)	0
Other	7 (5%)	1 (1%)	4 (3%)	0	2 (1%)
Total tabulated	149	154	157	149	147
% of fellows represented in the survey	94%	93%	98%	91%	94%
% of fellows in faculty position	52%	56%	50%	59%	48%

^aPediatric Hematology Oncology.

*Subspecialty fellow defined as seeking additional training in either an ACGME or non-ACGME accredited training program.

In response to the COVID-19 pandemic, 19% of institutions had to furlough PHO staff, 32% cut salaries and/or bonuses, 46% had a hiring freeze, and 60% of hospitals saw a drop in PHO patient levels, which have now returned to pre-pandemic levels in 71% of respondents. Overall, the COVID-19 pandemic reduced PHO patient levels but did not cause employees to be let go, leave, or be furloughed by most institutions.

3.2 | Fellowship employment survey

The 2020 survey of employment of graduating fellows was distributed by email to all U.S. ACGME-accredited PHO fellowship program directors. Responses were obtained from 65 out of 72 programs (90% participation rate). The survey results are shown in Table 3.

Approximately 50% of graduates were recruited into positions at academic medical centers as an assistant professor or instructor. Approximately 7% accepted positions in nonacademic PHO programs, and 3% were employed as hospitalists. A small fraction of graduates (8%) took positions in government, the pharmaceutical industry, or in a clinical or nonclinical field not associated with PHO.

Interestingly, nearly one-third of all PHO fellowship graduates pursued additional subspecialty training, which in most cases was extended clinical training in an area of interest in a non-ACGME certified program. These areas of interest included extended training in HSCT, neuro-oncology, and hemostasis/thrombosis, in addition to ACGME-accredited fellowships in palliative care or transfusion medicine. The percentage of fellow graduates pursuing this additional training has increased over time, from 26% in 2016 to 33% in 2020. A breakdown of subspecialty training is shown in Figure 3. The most common post-ACGME fellowship training paths were continuation of research (33%) and HSCT training (31%); however, further training in neuro-oncology, hemostasis/thrombosis, and palliative care com-

prised an additional 20% of graduates. Also, some fellow graduates pursued additional training in adolescent and young adult oncology, immunotherapy, survivorship, transfusion medicine, bone marrow failure, vascular malformations, and global health.

4 | DISCUSSION

The 2021 workforce survey was distributed to 212 programs with a 31% response rate. Most responses were from small or medium-sized programs, which represented an increase compared with previous surveys. This change in survey respondents likely had a significant effect on the aggregate data. The shifting phenotype in the program respondents over time may necessitate a breakdown of survey results by program size and/or practice type in the future to provide the most impactful comparative and benchmarking data. Strategies to increase response rates will be critical to ASPHO's efforts to provide programs with data to assist in their increasing endeavors to advocate for resources for our patients and our field.

ASPHO membership demographics obtained from its member database demonstrate most PHO physicians are part of large (47%) or medium (34%) programs, with only 14% in small programs (accessed October 2022). Most providers are employed in university/academic practice (57%) or a hospital-based practice (38%), compared with ASPHO membership data as of October 2022 of 54 and 37%, respectively (accessed October 2022). The proportion of practice-type respondents in the 2021 survey appears to mirror the overall membership demographics.

Physician demographics continue to change, as primarily witnessed by the increasing proportion of female providers.⁶ Ethnic diversity for all providers has also increased, similar to other pediatric subspecialty fellowships and programs.^{3,4} These data appear reflective of the current trends in pediatrics.^{4,5}

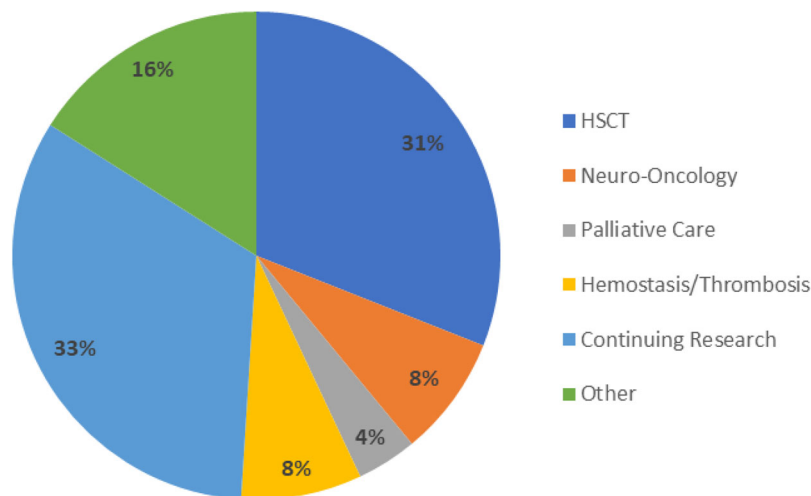


FIGURE 3 2020 Subspecialty Fellowship Graduate Distribution

The decline of APPs (as defined by the percentage of all providers) seems surprising, and likely is reflective of the workforce in small and medium-sized programs. ASPHO's report on the PHO workforce in 2018 emphasized the changing role of APPs in PHO, and it was expected this would be a continued trajectory. Interestingly, the surveys have not reflected an increasing role for hospitalists, with a total number reported on the survey in 2015 of 18 of 655 providers, in 2017 of 13 of 570 providers, and 18 of 690 total providers reported in 2021.¹

Productivity targets, measured as wRVUs per FTE, have remained stable.¹ However, the average number of weeks of inpatient service increased from the prior publication, from 12 to 14.6 weeks (a 22% increase). This likely reflects different practice models at small and medium-sized programs versus large programs, but it could represent a change in clinical care expectations as related to the available workforce and complexity of patient care. Outpatient clinical responsibilities (as measured by the number of half-day clinic sessions per week) remained stable, supporting the latter explanation. Overall, physicians report an increase from 60 to 75% of time spent providing clinical care. Provision of care by APPs plateaued after increasing in prevalence on prior surveys. On average, practices reported an average net gain of 1.2 physician FTEs, suggesting an expanded workforce. Taken together, these data suggest that physician providers have increased patient care demands since the prior survey.

The PHO 2020 fellowship graduate survey had an impressive response rate of 90%, and nearly all respondents of the fellowship graduate survey came from academic medical centers. The results of this survey revealed that most graduates continue to find employment in academic practices, matriculating into positions as an instructor or assistant professor. The percentage of graduates that take jobs in nonacademic practices, the pharmaceutical industry, or government, or who take hospitalist positions, has remained stable from 2016 to 2020.¹ However, there has been an increasing trend of fellows pursuing sub-subspecialty training post-PHO fellowship, totaling one-third (33%) of all graduates in 2020. Why more fellows are pursuing additional training is unclear and likely multifactorial. One hypothesis is that job openings in "desirable" locations at academic programs are

limited, and fellows pursue additional training to be more competitive for these niche positions. A corollary to this hypothesis is the perception that department chairs and division chiefs consider fellows with additional training more competitive for faculty positions.

Divisions, especially those in larger programs, may also be evolving towards regionalization of services, increasing specialization, and focusing growth in clinical care, experimental therapeutics, and research niches to further develop these sub-subspecialty areas. This also results in the localization of jobs primarily in urban areas. Other factors influencing the pursuit of additional training opportunities may be related to limited permanent jobs available due to hiring freezes (pandemic or funding related), evolving clinical roles of APPs, changes in immigration policies, and increasing limitations on research funding resources. Job prospects in desirable geographical areas (larger cities, spousal employment requirements, and family obligations) certainly play a role, potentially increasing the perception that jobs overall are therefore limited. A concern with short-term "instructor" positions is that they may lead to inequity in compensation, advancement opportunities, and job stability, and may become progressively unattractive to graduating fellows.

Increasingly, academic centers are offering non-ACGME sub-subspecialty training opportunities. Although the specific reason for creating these programs likely varies between institutions, it may represent an intersection between the education mission, funding challenges, and increasing patient complexity. The Workforce and Productivity Survey identified institutional funding as the top barrier facing PHO physicians in 2017 and 2021. A sub-subspecialty fellow may spend a substantial amount of time providing direct patient care and on-call coverage while still on a trainee pay scale, and therefore provide more options for clinical coverage in divisions with limited resources.

Reducing distress and burnout needs to be a focus of intervention. The 2021 survey results offer many opportunities for areas to address, including efforts to improve clinical and research support, remove barriers to new therapies, and decrease the impact of nonvalue-added administrative tasks (e.g., prior authorizations, insurance appeals).

The survey data suggest that the PHO workforce remains vibrant, is more diverse, and is meeting the needs of children with cancer and blood disorders. Yet, the survey also highlights the PHO workforce is facing a myriad of challenges, and policy and system changes are needed to mitigate these challenges. There is an immediate need to address the issues leading to high levels of burnout and professional dissatisfaction to ensure that the PHO workforce is able to continue to provide our patients with state-of-the-art care and access to specialized therapies. Responsibility for addressing and correcting these issues must be shared by healthcare systems and academic centers, which employ clinicians, scientists, and trainees, as well as by payors, including government programs and providers of research funding.

These survey results were reflective of the divisions whose directors, as well as ASPHO members, willingly participated in this endeavor. Our conclusions are based on the responses from the 31% of respondents, which may not be fully representative of some of the larger programs. Additionally, we recognize the survey questions and corresponding answers are, in some cases, subjective in nature. Given the vital nature of these data, we hope that these findings will prove valuable to directors and programs going forward and encourage our colleagues to continue to increase representation in future surveys to ensure the robustness of these data.

In conclusion, the work done by ASPHO to collect and synthesize data will continue to inform organizations and providers, as well as the future workforce, of changes in practice and identify areas of need. Our specialty has a dynamic and cohesive history of blending laboratory and clinical research with patient care to advance treatments and improve outcomes. This same model of cross-collaboration will be necessary among providers, institutions, payors, and regulatory agencies to ensure the PHO workforce can continue to meet our mission for the patients we serve.

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CONFLICT OF INTEREST

No conflicts of interests were reported by the authors.

DISCLAIMER

The American Society of Pediatric Hematology/Oncology Workforce, Productivity, and Fellowship Assessment: Current State of the Workforce (the "Assessment") is published by The American Society of Pediatric Hematology/Oncology ("ASPHO") and is a compilation of information provided solely by participating division directors and institutions in response to a voluntary survey conducted by ASPHO with the assistance of Vault Consulting, an independent, third-party

provider responsible for collecting, compiling, aggregating, and distributing all data (the "Survey"). The information published in the Assessment was developed from historical information and does not include any projected information. Neither ASPHO nor Vault Consulting has verified the accuracy, completeness, or suitability of any information provided in the Assessment, and ASPHO does not recommend, encourage, or endorse any particular use of the information reported. ASPHO makes no warranty, guarantee, or representation whatsoever and assumes no liability or responsibility in connection with the use or misuse of the Assessment or the Survey.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from ASPHO. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the author(s) with the permission of ASPHO.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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Supplemental table: 2021 ASPHO Workforce Survey Participating Institutions

Aflac Cancer and Blood Disorders Center at Children's Healthcare of Atlanta

Akron Children's Hospital

Banner Diamond Children's Medical Center Baystate Children's Hospital

Beaumont Children's

Beverly Knight Olson Children's Hospital at Atrium Health Navicent

Blank Children's Hospital Cancer and Blood Disease Institute

Cardinal Glennon Children's Hospital Charleston Area Medical Center

Louisiana State University Health Sciences Center Children's Hospital

Children's Cancer and Blood Disorders Program at Randall Children's Hospital

Children's Hospital Oakland

Children's Hospital of Georgia Children's Hospital of San Antonio

Children's Hospital of WI/Medical College of WI

Children's Minnesota

Children's of Mississippi Center for Cancer and Blood Disorders

Cohen Children's Medical Center

Dartmouth Hitchcock Medical Center

Essentia Health Duluth Clinic

Ethie Haworth Children's Cancer Center at Helen DeVos Children's Hospital/Spectrum Health

Gill Center for Cancer and Blood Disorders

Golisano Children's Hospital of SW Florida

HSHS St. Vincent Children's Hospital

Jimmy Everest Center at Oklahoma Children's Hospital

Johns Hopkins All Children's Hospital

Johns Hopkins University School of Medicine

Kaiser Permanente GWU (Children's National)

Kaiser Permanente SoCal

KU Pediatrics Wichita KS

Lutheran Hospital

Mary Bridge Children's Hospital

Mass General Hospital for Children

Medical University of SC

Mercy St. Louis

M Health Fairview Masonic Children's Hospital

Nationwide Children's Hospital

Nemours Children's Health-Jacksonville

Nemours Children's Hospital

Newark Beth Israel

Ochsner Medical Center

OHSU Doernbecher Children's Hospital

Palms West Hospital

Pediatric Hematology / Oncology Hasbro Children's Hospital

Pediatric Hematology/ Oncology Mission Hospital

Providence Sacred Heart Children's Hospital

Rady Children's Hospital and UCSD School of Medicine

Renown Children's Hospital

Riley Hospital for Children

Roswell Park Oishei Children's Cancer and Blood Disorders Program

SIUH Northwell

St Joseph's Children's Hospital

Texas Children's Cancer and Hematology Center

UCLA Mattel Children's Hospital

University of Iowa

University of Kansas Medical Center

University of Kentucky

University of Nebraska Medical Center/Children's Hospital

UPMC Children's Hospital of Pittsburgh

UVA Children's Hospital

Vanderbilt University/Children's Hospital at Vanderbilt

Wake Forest Baptist Medical Center

WUSM Department of Pediatrics Division of Hematology & Oncology

Yale University