Tracking the Workforce: The American Society of Clinical Oncology Workforce Information System

By M. Kelsey Kirkwood, Michael P. Kosty, MD, FACP, Dean F. Bajorin, MD, Suanna S. Bruinooge, and Michael A. Goldstein, MD

American Society of Clinical Oncology, Alexandria, VA; Scripps Clinic, La Jolla, CA; Memorial Sloan-Kettering Cancer Center, New York, NY; and Beth Israel Deaconess Medical Center, Boston, MA

Abstract

Purpose: In anticipation of oncologist workforce shortages projected as part of a 2007 study, the American Society of Clinical Oncology (ASCO) worked with a contractor to create a workforce information system (WIS) to assemble the latest available data on oncologist supply and cancer incidence and prevalence. ASCO plans to publish findings annually, reporting on new data and tracking trends over time.

Methods: The WIS report is composed of three sections: supply, new entrants, and cancer incidence and prevalence. Tabulations of the number of oncologists in the United States are derived mainly from the American Medical Association Physician Masterfile. Information on fellows and residents in the oncology workforce pipeline come from published sources such as *Journal of the American Medical Association*. Incidence and preva-

lence estimates are published by the American Cancer Society and National Cancer Institute.

Results: The WIS reports a total of 13,084 oncologists working in the United States in 2011. Oncologists are defined as those physicians who designate hematology, hematology/oncology, or medical oncology as their specialty. The WIS compares the characteristics of these oncologists with those of all physicians and tracks emerging trends in the physician training pipeline.

Conclusion: Observing characteristics of the oncologist workforce over time allows ASCO to identify, prioritize, and evaluate its workforce initiatives. Accessible figures and reports generated by the WIS can be used by ASCO and others in the oncology community to advocate for needed health care system and policy changes to help offset future workforce shortages.

Introduction

On the basis of an American Society of Clinical Oncology (ASCO)–commissioned 2007 study, it is anticipated that cancer occurrence among the expanding elderly US population will substantially outpace the capacity for oncologist services by 2020.¹ This original study was a landmark analysis for assessing current supply and demand and predicting changes over time. One limitation, however, was that the study provided only a one-time snapshot of the oncologist workforce. In light of these findings, ASCO has made a standing commitment to investigate, initiate, and evaluate programs to assess oncologist supply and demand in detail on an ongoing basis.² By studying these factors, ASCO can more accurately predict workforce trends, review and consider research and programs focused on efficiency of clinical practice, and prepare current and future oncologists for an environment in which supply can be enhanced compared with traditional cancer delivery models.

ASCO commissioned the Center for Workforce Studies at the Association of American Medical Colleges (AAMC) to design and produce a workforce information system (WIS), thus providing ASCO with an ongoing method for data collection and reporting on the current status of the oncologist workforce. The resulting system includes a database for storing data on the supply of oncologists, new entrants into the workforce, and incidence and prevalence of cancer. Furthermore, ASCO is equipped with tools to generate new figures and reports linked to the underlying database to monitor shifts in the character and

size of the workforce, to inform new and existing programs, and to advocate for policy changes. This article describes the key findings of the inaugural annual report, posted in its entirety at www.asco.org/WIS, and provides information on ongoing work of ASCO in the area.

Methods

The WIS report features a series of figures and data tables showing trends over time in the supply of oncologists practicing and in training in the United States. The report is organized into three sections: supply, new entrants, and cancer incidence and prevalence. In general, the report focuses on three main oncology specialties—hematology, hematology/oncology, and medical oncology—but also presents benchmarking data on other oncology specialties, other subspecialties of internal medicine, and on all physicians. Throughout this article and the online report, the grouping of hematology, hematology/oncology, and medical oncology is referred to as “oncology (composite).” Data on the individual oncology specialties can also be found in many of the figures and tables contained in the report.

The supply section of the WIS focuses on oncologists working in the United States. Many sources of data were considered for the most accurate tabulation of oncologists within the WIS, each with distinct benefits and limitations. ASCO has access to detailed geographic and demographic information on oncologists through its robust membership database; however, this

does not account for practicing oncologists who are not members of ASCO. Another method could involve examining the number of oncologists who seek certification in oncology from the American Board of Internal Medicine (ABIM). ABIM publishes annual certification information on its Web site, but these data are only available in aggregated totals and cannot be reexamined according to age, sex, race, or other characteristics of interest.³ Furthermore, board certification is optional for physicians, and it is unknown how many physicians do not seek certification. ASCO plans to explore whether ABIM data could also be analyzed in future versions of the WIS.

Building on work from the 2007 ASCO workforce study, the AAMC developed a plan to obtain annual oncologist supply figures from the American Medical Association (AMA) Physician Masterfile database. Although the Masterfile was not designed for workforce analysis, the AAMC concluded that it is the most complete roster of physicians available.⁴ The use and reference to AMA data by ASCO should not be construed as endorsement by the AMA, nor do the ideas or opinions expressed herein reflect the views of the AMA. Throughout the WIS, supply data are reported as the number of physicians who designated a particular primary specialty (eg, hematology/oncology) within the database.

It is important to clarify that the Masterfile is not limited to physicians who are members of the AMA. It is also important to acknowledge several limitations to using Masterfile data as a proxy for counting the number of physicians in the United States. Most of each physician's information contained in the Masterfile comes from the AMA Census of Physicians. A physician typically receives the AMA Census every 3 to 4 years, which may result in a lag in changing a physician's status from active to inactive. Because much of the information is self-reported through the AMA Census, there are also issues with interpretation (eg, which specialty field a physician chooses as his/her primary specialty) and missing fields. In addition, physician board certification information is not available through the Masterfile.⁴ To improve the utility of the Masterfile as a research tool, and thereby the WIS, ASCO encourages its members to visit the AMA Census Web site to update their information.⁵

The second section of the WIS relates to physicians currently training in the United States. The report focuses on residents in internal medicine, obstetrics/gynecology, and pediatrics who are eligible to enter training in hematology, medical oncology, combined hematology/oncology, gynecologic oncology, and pediatric hematology/oncology fellowship programs, as well as on current oncology fellows. Data from the new entrants section comes from data published by the National Residency Match Program, ABIM, and *Journal of the American Medical Association (JAMA)*.^{6,4,7-13} Each year, typically in the fall, *JAMA* publishes its medical education theme issue, which includes information on US medical residents and fellows. The data are derived from the AAMC/AMA National Graduate Medical Education (GME) Census and represent an undercount of residents and fellows, because they do not account for late reporting. Furthermore, the GME Census represents only pro-

grams that are accredited by the Accreditation Council for GME (ACGME).⁷⁻¹³

The final section of the WIS presents several figures on national cancer incidence and prevalence estimates. Data on new cancer cases are culled from the annual online publication by the American Cancer Society of *Cancer Facts and Figures*, which is prepared jointly with the National Cancer Institute.¹⁴ Data on cancer survival rates and prevalence measures come from the National Cancer Institute SEER Cancer Statistics Review publications.¹⁵

ASCO recognizes the shortcomings of equating cancer incidence and prevalence with demand for oncology services, but the WIS was assembled within the constraints of publicly available data. The longer survival of patients, the complex mix of survivor and patient demands (eg, many patients with breast cancer demand more-intense follow-up at a given point in their disease continuum than patients with other malignancies), diversity in treatment regimens (eg, oral *v* parenteral), and insurance limitations are a few important and potentially confounding factors. Therefore, we will primarily focus on supply components of the WIS throughout this article. ASCO is conducting other studies that examine demand for services in more-comprehensive ways and will update the WIS with this information, if possible.

Results

The WIS reports a total of 13,084 oncologists (composite) working in the United States in 2011 (Fig. 1). Oncologists (composite) refer to those physicians in the AMA Physician Masterfile who specified hematology, hematology/oncology, or medical oncology as their primary specialty in the AMA Census of Physicians. Since 2004 (the earliest year reported in the WIS), the number of oncologists has been steadily increasing at a rate of approximately 3% each year. Of these 13,084 oncologists, 10,644 (81.4%) specified direct patient care as their primary professional activity. Of these oncologists who specified direct patient care, the majority (58.3%) designated group practice as their employment setting. Additional information on employment setting can be found in the online WIS report.

Figure 1 also shows the numbers of gynecologic oncologists, pediatric hematologist/oncologists, radiation oncologists, and surgical oncologists. Combined, there were a total of 20,599 oncologists working in these six specialties in 2011. For the purposes of this article, oncologist demographics are described according to the oncologist (composite) subgroup of physicians. Additional information on the gynecologic oncologist, pediatric hematologist/oncologist, radiation oncologist, and surgical oncologist workforces can be found within the full report.

In 2011, there were 3,716 women (28.4%) in the oncologist (composite) workforce. Compared with the overall physician workforce, with a percentage of 31.2%, oncology has a lower proportion of women in the workforce. This proportion has been rising consistently each year for all physicians and across each of the three main oncology subspecialties.

Figure 1. Number of oncologists (MDs and doctors of osteopathic medicine [DOs]). (*) Active physicians (MDs and DOs, excluding residents/fellows) who specified hematology/oncology, medical oncology, or hematology as their primary specialty in the American Medical Association Census of Physicians. Physicians are considered active if their major professional activity is something other than semi-retired, retired, temporarily not in practice, or not in practice for some other reason.

To monitor concerns of the aging workforce, the WIS tracks oncologists by median age and by age group. The median age for oncologists increased from 51 years in 2010 to 52 years in 2011. When comparing oncologists by age group, the number of oncologists age 64 years or older has been growing more rapidly than the overall number of oncologists. In 2008, the number of oncologists age 64 years or older surpassed the number of oncologists younger than age 40 years. In comparison with the overall physician workforce, the middle-range oncologist has been 1 year older than the middle-range physician in each of the documented years, with the exception of 2010, in which they were equal.

The supply section of the WIS addresses other key characteristics of the oncologist workforce, including information on osteopathic, allopathic, and international medical graduate (IMG) training levels. The oncologist workforce in 2011 was comprised of 32.8% IMGs, whereas the overall physician workforce was 24.0% IMGs. Additional information on physician supply can be found in the full WIS report.

Section two of the WIS concentrates on the incoming pipeline of physicians from ACGME-accredited residency and fellowship training programs in oncology and other internal medicine subspecialties. From 2004 to 2010, the number of residency slots in internal medicine, obstetrics/gynecology, and pediatrics that fed into hematology, hematology/oncology, medical oncology, gynecologic oncology, and pediatric hematology/oncology fellowship programs remained relatively flat, increasing by 0.6% between 2009 and 2010. Furthermore, the percentage of first-year internal

Figure 2. Percentage of first-year internal medicine (IM) subspecialty fellows by subspecialty. (*) Of all fellows in program year 1 (PY1) positions in IM subspecialty programs (excluding interventional cardiology and clinical cardiac electrophysiology) accredited by the Accreditation Council for Graduate Medical Education (ACGME), the percentage in hematology, hematology/oncology, and medical oncology programs. (†) Of all fellows in PY1 positions in IM subspecialty programs (excluding interventional cardiology and clinical cardiac electrophysiology) accredited by the ACGME, the percentage in selected IM subspecialties.

medicine fellows in the oncology (composite) subspecialties combined has remained relatively stable at levels of approximately 14.5% since 2005. Figure 2 compares these percentages with those of other subspecialty fellows in internal medicine.

The WIS also documents the demographic composition of the new entrants into the workforce as related to sex, international medical training, race, and ethnicity (Table 1). Of oncology (composite) fellows in 2010, 44.7% were women—a percentage much higher than that in the current supply. IMGs are also more prevalent in training programs than in the current workforce. Under-represented minorities are even more under-represented in oncology than in fellowship and residency programs in general. The proportions of oncologist (composite) fellows who self-identify as black or African American (3.1% in 2010) or Hispanic or Latino (7.5%) are consistently lower than those in the parent internal medicine programs and many of the other internal medicine subspecialty fellowships (eg, the proportions for the infectious diseases subspecialty are 6.9% black or African American and 12.1% Hispanic or Latino). Concerning the race data taken from *JAMA* publications, it is important to note that in a given year, as many as 11.3% of the residency and fellowship program participants are listed as other/unknown.⁷⁻¹³ ASCO hopes that through awareness and better reporting, these data may become richer in future years.

Table 1. Workforce Characteristics of Fellows and Residents

Characteristic	Fellows and Residents (%)						
	2004	2005	2006	2007	2008	2009	2010
Women*							
All fellows and residents	41.8	42.6	43.6	44.4	45.1	46.0	46.1
Internal medicine residents	41.9	42.4	43.4	43.9	44.5	44.8	44.7
Oncology (composite) fellows†	41.5	42.8	43.0	42.2	42.6	44.5	44.7
IMG‡							
All fellows and residents	26.4	26.8	26.9	27.2	27.3	27.4	27.3
Internal medicine residents	41.7	43.7	44.1	44.5	44.6	45.2	44.6
Oncology (composite) fellows†	35.7	34.7	35.1	38.7	40.3	42.4	42.9
Black or African American§							
All fellows and residents	5.3	5.2	5.6	5.5	5.7	5.8	5.9
Internal medicine residents	5.0	4.8	5.5	5.4	5.5	5.7	5.6
Oncology (composite) fellows†	3.8	3.2	3.1	3.5	4.0	3.3	3.1
Hispanic							
All fellows and residents	6.3	6.2	6.7	7.0	7.5	8.0	7.9
Internal medicine residents	6.2	6.4	7.6	7.8	8.2	9.1	8.7
Oncology (composite) fellows†	4.5	3.5	4.7	5.4	7.0	7.2	7.5

NOTE. Data adapted.⁷⁻¹³

Abbreviations: ACGME, Accreditation Council for Graduate Medical Education; DO, doctor of oncology; GME, general medical education; IMG, international medical graduate.

* Percentages are based on the number of fellows and residents for whom sex is known.

† Data represent the total number of fellows (MDs and DOs) in hematology, hematology/oncology, and medical oncology GME programs accredited by the ACGME.

‡ Percentages are based on fellows whose medical school is known. Physicians who graduated from medical schools in the US territories or Canada are not considered IMGs.

§ Figures represent the percentage of residents and fellows who are black or African American. This includes people who are non-Hispanic and black as well as those who are Hispanic and black.

|| Figures represent the proportion of residents and fellows in ACGME-accredited programs who are Hispanic or Latino. People who are Hispanic or Latino can be of any race.

To monitor the rise of cancer rates in the United States, the WIS incorporates information on cancer incidence and prevalence. In 2012, there were an estimated 1.6 million new cancer cases in the United States, an increase of 2.6% from the previous year.¹⁴ As of 2009, a total of 12.5 million people were living with a history of cancer (either as patients or survivors), an increase of 5.0% from the previous year, with 67.4% of patients surviving cancer 5 years after diagnosis in 2004.¹⁵ Figures and tables related to these estimates can be found in the full WIS report online.

Discussion

Compared with the overall physician workforce, the oncologist workforce is growing at an increased pace (2.8% from 2010 to 2011, compared with the overall physician increase of 1.0%), but certain important aspects of the workforce have not converged with the general physician trends. Two of these aspects, one affecting the training pipeline and the other related to oncologists nearing retirement, are potentially worrisome. First, the proportion of IMGs is increasing each year in oncology and is consistently higher than that in the overall physician population. This high proportion of oncology IMG trainees—many of whom are on visas allowing them remain in the United States temporarily while in training—implies that a certain proportion may not permanently enter the US oncology workforce. It is an observation requiring further study. Second, the oncologist workforce has a higher median age than the physician workforce, and a growing proportion of oncol-

ogists are age 64 years or older. Age has an important effect on the workforce composition because of retirement rates and a host of other factors, such as part-time arrangements and productivity; therefore, it will be essential to monitor these trends in the coming years.¹ Staying attuned to these workforce attributes will help ASCO prioritize initiatives.

There are substantial differences between the demographic attributes of the current oncologist training pipeline and those seen among all residents and fellows in training. More than 44% of oncology fellows in ACGME schools are women, and the percentages are increasing each year. However, the proportion of women entering the oncology workforce has been consistently lower than the proportions seen in the overall physician trainee population. The disparity for under-represented minorities in ACGME-certified oncology training programs compared with all fellows and residents is particularly concerning. This disparity is much greater for self-identified black or African American trainees in oncology; the percent in oncology is approximately half of the percentage (3.1% v 5.9%) seen in overall training programs. Consistently lower percentages of self-identified Hispanics are also entering the oncology workforce compared with internal medicine as a whole, for reasons that are unknown. Workforce initiatives must identify the reasons for these disparities, and study interventions that will enhance under-represented minority inclusion in the oncology field must be developed. Accounting for the needs of the incoming workforce in addition to those of practicing physicians remains a priority for ASCO.

In addition to identifying emerging trends in the training workforce, the WIS helps us observe the low capacity for expansion in oncology fellowship programs resulting from the stagnant growth in residency programs that feed into oncology fellowships under the current US physician training mechanisms. ASCO surveys of oncology training program directors consistently identify fellow funding as a major impediment to expansion.^{1,16} ASCO should continue to look for ways to influence graduate medical education reform and to enhance funding for oncology training programs. Additionally, enhancing fellowship training to better integrate collaboration with nonphysician practitioners or advanced practice providers (specifically nurse practitioners and physician assistants) may enable physicians to be more productive at the outset of their clinical careers. Exploring new ways to increase efficiency in existing oncology practice has been a priority of ASCO workforce initiatives, evidenced by a study in 2010 that examined models integrating nonphysician practitioners into oncology practice.¹⁷ Critical findings from this study highlight the fact that oncology practices need tools to train nonphysician practitioners in oncology-specific care (particularly those without prior oncology experience). In addition, the extent to which nonphysician practitioners and compensation models may enhance the delivery of cancer services is also unknown. It is an area that deserves more study by ASCO.

It is also important to monitor shifts in demand for cancer services. With increasing understanding of the science of cancer development, new treatment options, and drug discoveries, many patients with cancer today can look forward to long lives as cancer survivors. As the number of cancer survivors increases, the population of patients who are no longer in active care grows larger. If survivors continue to be seen by oncologists, this increase in patients will affect the amount of time oncologists are able to spend with newly diagnosed patients, those with recurrences, and those in active care. A significant limitation of the WIS is that it does not provide a good basis for monitoring cancer care demand. ASCO currently has other studies under way to better explore demand. In the meantime, ASCO can leverage incidence and prevalence figures and findings from the WIS to strengthen its advocacy for improving supply and efficiency within the oncology workforce.

The effectiveness of the WIS as an analysis and advocacy tool is only as strong as the data comprising its elements. As part of its ongoing work in the area, ASCO will continue to scan the workforce and research literature for new and improved methods of quantifying supply and demand in oncology. For instance, the ASCO Workforce Advisory Group (a group of ASCO members who advise the society on its workforce data collection and policy) is exploring the use of the National Provider Identifier Registry, a database operated by the Centers for Medicare and Medicaid Services, to enhance the supply calcu-

lations within the WIS.¹⁸ ASCO will stay abreast of such strategies as it plans for future publications of the report.

Critically affecting all these initiatives, the economic, social, and political environments within the United States have dramatically changed since the publication of the original workforce study in 2007, leading us to wonder if the workforce projections from 2007 remain relevant in current times. When comparing the 2007 projection figures with current data from the AMA Masterfile, the supply of oncologists is 22.3% higher than the projections for 2011. As noted, ASCO is conducting, as an additional corollary to the WIS, studies to recalibrate the 2007 supply and demand projections, taking new methodologies and the current environment into account to better understand the nature and magnitude of future workforce shortages.

In any future conditions, the health care delivery system, the health care workforce population, and the patient and survivor population in the United States will vary considerably from what we see today and what we witnessed a decade ago. It is therefore essential to track these changes continuously, making sure our initiatives to improve the workforce are timely and relevant. The WIS is one of the tools ASCO will employ going forward to more accurately model the oncology workforce.

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Author Contributions

Conception and design: Michael P. Kosty, Dean F. Bajorin, Suanna S. Bruinooge, Michael A. Goldstein

Collection and assembly of data: M. Kelsey Kirkwood, Michael A. Goldstein

Data analysis and interpretation: All authors

Manuscript writing: All authors

Final approval of manuscript: All authors

Corresponding author: M. Kelsey Kirkwood, American Society of Clinical Oncology, 2318 Mill Rd, Suite 800, Alexandria, VA 22314; e-mail: kelsey.kirkwood@asco.org.

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References

1. Erikson C, Salsberg E, Forte G, et al: Future supply and demand for oncologists: Challenges to assuring access to oncology services. *J Oncol Pract* 3:79-86, 2007
2. Future supply of and demand for oncologists. *J Oncol Pract* 4:300-302, 2008

3. American Board of Internal Medicine: ABIM exam information and statistics. <http://www.abim.org/about/exam-information-statistics.aspx>

4. Key Trends in Tracking Supply of and Demand for Oncologists: A Report to the American Society of Clinical Oncology (ASCO) from the AAMC Center for Workforce Studies. Washington, DC, Association of American Medical Colleges, 2012

5. American Medical Association: Online data collection center. <http://www.ama-assn.org/ama/pub/about-ama/physician-data-resources/online-data-collection-center.page>
6. National Residency Match Program: Data and reports. <http://www.nrmp.org/data/>
7. Brotherton SE, Rockey PH, Etzel SI: US graduate medical education, 2004-2005: Trends in primary care specialties. *JAMA* 294:1075-1082, 2005
8. Brotherton SE, Etzel SI: Graduate medical education, 2005-2006. *JAMA* 296:1154-1169, 2006
9. Brotherton SE, Etzel SI: Graduate medical education, 2006-2007. *JAMA* 298:1081-1096, 2007
10. Brotherton SE, Etzel SI: Graduate medical education, 2007-2008. *JAMA* 300:1228-1243, 2008
11. Brotherton SE, Etzel SI: Graduate medical education, 2008-2009. *JAMA* 302:1357-1372, 2009
12. Brotherton SE, Etzel SI: Graduate medical education, 2009-2010. *JAMA* 304:1255-1270, 2010
13. Brotherton SE, Etzel SI: Graduate medical education, 2010-2011. *JAMA* 306:1015-1030, 2011
14. American Cancer Society: Cancer facts and figures. <http://www.cancer.org/research/cancerfactsfigures/cancerfactsfigures/index>
15. Howlader N, Noone AM, Krapcho M, et al: (2012) SEER cancer statistics review, 1975-2009 (vintage 2009 populations), National Cancer Institute. http://seer.cancer.gov/csr/1975_2009_pops09/
16. Erikson C, Schulman S, Kosty M, et al: Oncology workforce: Results of the ASCO 2007 program directors survey. *J Oncol Pract* 5:62-65, 2007
17. Towle EL, Barr TR, Hanley A, et al: Results of the ASCO study of collaborative practice arrangements. *J Oncol Pract* 7:278-282, 2011
18. Centers for Medicare and Medicaid Services: National Plan and Provider Enumeration System. <https://nppesregistry.cms.hhs.gov/NPESRegistry/NPIRegistryHome.do>

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