Board-Certified Oncology Pharmacists: Their Potential Contribution to Reducing a Shortfall in Oncology Patient Visits

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QUESTION ASKED: In light of the projected shortage of oncologists, is there evidence that pharmacists could help fill the gap and, if so, what particular clinical services could they provide during those visits?

SUMMARY ANSWER: We estimated that by year 2020, over 3,000 pharmacists who are board-certified in oncology could contribute 2.6 to 3.3 million 30-minute patient visits. Specific clinical services were identified by board-certified oncology pharmacists (BCOPs) using multiple surveys (Table 1).

METHODS: We used available data to estimate how many BCOPs could be available by year 2020. We also used a Delphi expert panel process to identify clinical services BCOPs could provide along with how many 30-minute patient visits they could potentially contribute.

BIASES, CONFOUNDING FACTOR(S), DRAWBACKS: The Delphi panel consisted solely of oncology pharmacists; other health care team members might have responded differently to survey questions. Estimates could be subject to changes in data trends. It is likely that the estimate of available BCOPs by 2020 is high because available data include international BCOPs. A confounding factor is that current regulations from the Center for Medicare and Medicaid Services (CMS) do not recognize pharmacists as health care providers, thereby limiting reimbursement for clinical services. Until the CMS modifies these regulations, the employment of pharmacists to provide patient care will likely be restricted.

REAL-LIFE IMPLICATIONS: These results suggest that practicing oncologists may benefit by utilizing BCOPs to see some of their patients that need particular clinical services. The clinical services that BCOPs could provide that received the strongest consensus (> 80%) are shown in Table 1. These services overlap and also complement those provided by nurse practitioners and physician assistants. Oncology practices wishing to improve capacity, breadth, and/or efficiency are encouraged to consider using BCOPs, particularly for those services identified in this study.
Table 1. Characteristics of Delphi Panelists

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice setting</td>
<td>10 academic, 3 office based</td>
</tr>
<tr>
<td>Geographic location</td>
<td>States represented by US Census region:</td>
</tr>
<tr>
<td></td>
<td>Northeast: Maine, New York (2)</td>
</tr>
<tr>
<td></td>
<td>Midwest: None</td>
</tr>
<tr>
<td></td>
<td>South: Alabama, Maryland, North Carolina (2), Oklahoma, Texas</td>
</tr>
<tr>
<td></td>
<td>West: Arizona, Colorado, Idaho, Oregon</td>
</tr>
<tr>
<td>Hold or have held BCOP status</td>
<td>13 (100%)</td>
</tr>
<tr>
<td>Experience, years</td>
<td>Median, 16; mean, 16.8 (SD, 9.0)</td>
</tr>
<tr>
<td>PGY2 oncology pharmacy residency</td>
<td>9 of 13 (69%)</td>
</tr>
<tr>
<td>PGY1 pharmacy residency</td>
<td>8 of 13 (62%)</td>
</tr>
</tbody>
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Abbreviations: BCOP, Board-certified oncology pharmacist; PGY1, postgraduate year 1; PGY2, postgraduate year 2; SD, standard deviation.
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Abstract

Purpose
With an aging US population, the number of patients who need cancer treatment will increase significantly by 2020. On the basis of a predicted shortage of oncology physicians, nonphysician health care practitioners will need to fill the shortfall in oncology patient visits, and nurse practitioners and physician assistants have already been identified for this purpose. This study proposes that appropriately trained oncology pharmacists can also contribute. The purpose of this study is to estimate the supply of Board of Pharmacy Specialties–certified oncology pharmacists (BCOPs) and their potential contribution to the care of patients with cancer through 2020.

Methods
Data regarding accredited oncology pharmacy residencies, new BCOPs, and total BCOPs were used to estimate oncology residencies, new BCOPs, and total BCOPs through 2020. A Delphi panel process was used to estimate patient visits, identify patient care services that BCOPs could provide, and study limitations.

Results
By 2020, there will be an estimated 3,639 BCOPs, and approximately 62% of BCOPs will have completed accredited oncology pharmacy residencies. Delphi panelists came to consensus (at least 80% agreement) on eight patient care services that BCOPs could provide, and study limitations.

Conclusion
BCOPs can contribute to a projected shortfall in needed patient visits for cancer treatment. BCOPs, along with nurse practitioners and physician assistants could substantially reduce, but likely not eliminate, the shortfall of providers needed for oncology patient visits.
INTRODUCTION

In 2005, the American Association of Medical Colleges (AAMC) Center for Workforce Studies was commissioned by the American Society of Clinical Oncology (ASCO) to analyze the oncology workforce in the United States. The Center for Workforce Studies survey showed that by 2020 there would be a 48% increase in patient visits but only a 14% increase in the supply of oncologists. The resulting shortage was estimated to range between 2,550 and 4,080 oncologists and 9.4 to 15.4 million patient visits missed annually. Factors believed to be responsible for this shortage include the increasing elderly population, the increasing incidence of cancer, the increasing number of survivors of cancer, new complicated therapies (eg, oral chemotherapy), the aging oncology workforce, and fewer newly trained oncologists. A 2014 update from ASCO reaffirmed shortages through 2025. Furthermore, it was estimated that these numbers could increase by approximately 9% as a result of an additional 32 million people now insured under the Affordable Care Act.

Several scenarios have been proposed to resolve the shortage, including training more oncologists and improving the efficiency of oncology care and the use of nonphysician practitioners (NPPs). Results from the survey showed that 56% of oncologists used NPPs in advanced practice roles within their practice. Advanced practice roles of nurse practitioners and physician assistants consisted of assisting with new patient consults, ordering routine chemotherapy, and performing invasive procedures. Although it was estimated that the use of nurse practitioners and physician assistants would yield 1.9 to 2.1 million additional patient visits annually, a deficit of 7.6 to 13.1 million of 61 million total visits was projected by 2020. The AAMC study did not examine or mention the position of the oncology pharmacist as an NPP who could potentially reduce the shortage.

Roles of Oncology Pharmacists

Holle and Michaud discuss the evolving role that oncology pharmacists play in cancer treatment; this article referenced the oncology scope-of-practice document from the Hematology Oncology Pharmacy Association. The authors describe the training of oncology pharmacists and highlight core functions performed in collaborative practices, including patient education, medication teaching, especially oral anticancer drugs, education of other health care practitioners, development of therapeutic guidelines, safe handling of medication practices, medication therapy management, prescribing of specified drugs under an approved protocol, and clinical research. Several other studies have described the role of an oncology pharmacist working in a collaborative practice setting. Although there are major differences in the specialty training and skills between nurse practitioners, physician assistants, and oncology pharmacists, their roles seem to be complementary and suggest that a team approach could improve efficiency of care.

Financial concerns influence the feasibility of adding BCOPs to a care team and are beyond the scope of this study. Although state-level legislation is currently expanding clinical roles for pharmacists, for example, in California, national legislation is required to name pharmacists as NPPs and allow for reimbursement of their services.

Pharmacist Education, Training, and Board Certification

Accredited Doctor of Pharmacy (PharmD) programs require ≥ 2 years of prerequisite college coursework in math and science, are generally 4 years in length, focus on medications and their relationship to health and illness, and include ≥ 1 year of clinical training.

Advanced training in the clinical arena has traditionally occurred through pharmacy residencies. The American Society of Health-System Pharmacists (ASHP) accredits pharmacy residency programs on the basis of rigorous standards. Currently, ASHP accredits two tiers of residency programs: postgraduate year 1 (PGY1) pharmacy residencies and postgraduate year 2 (PGY2) specialized residencies, which may include oncology.

Beyond training, pharmacists can demonstrate knowledge in oncology practice by passing a Board of Pharmacy Specialties (BPS) certification examination in oncology, which leads to the designation BCOP. BPS defines a BCOP as “[a pharmacist] who recommends, designs, implements, monitors, and modifies pharmacotherapeutic plans to optimize outcomes in patients with malignant disease.” Eligibility to sit for the BPS oncology examination requires completion of a specialty (PGY2) residency in oncology pharmacy; or a PGY1 residency plus an additional 2 years of practice after pharmacist licensure with ≥ 50% of the time spent in oncology pharmacy activities; or 4 years of practice experience, after pharmacist licensure, with ≥ 50% of the time spent in oncology pharmacy activities. The combination of a PGY2 oncology residency and BPS oncology certification provides maximum assurance to credentialing committees and others in hospitals, clinics,
office-based practices that a BCOP is prepared to participate on the oncology team in a patient care role. Although both advanced training and Board certification are important for acceptance into clinical roles, we elected to limit our study to those pharmacists with BPS oncology certification, the majority of whom have completed an oncology residency.

The purpose of this study was to estimate available BCOPs through 2020, to identify services BCOPs could provide to oncology patients, and to estimate their impact on the patient visit deficit.

METHODS

Institutional Review Board Review
This study received exempt status approval from the Touro University California Institutional Review Board.

Delphi Panel Process and Objectives
The Delphi process, which involves using experts to develop consensus through a process of iteration and feedback, was used for this study because sufficient data were not available to predict outcomes.17 We used the Delphi process to identify services that BCOPs could most reliably contribute to oncology patient care and to estimate how many patient visits BCOPs could provide. Consensus was defined as ≥80% of the panel reaching agreement for clinical services and convergence of responses for Likert scale items.17

The Delphi Process included three rounds (see Appendix). Round 1 elicited responses to baseline data regarding BCOP clinical functions, patient visit length, weekly visit numbers, and growth projections for PGY2 oncology residencies, new BCOPs, and total BCOPs through 2020. Comments were solicited for each category. Round 2 elicited responses to the same issues after Round 1 feedback was provided as well as responses to Round 1 comments regarding factors that could influence projections. Round 3 revisited the same issues after Round 2 feedback. This round was presented in manuscript form and comments were elicited.

Between rounds, reminder emails were sent at approximately 2-week intervals. After 5 weeks, feedback on responses from that round was emailed to panelists. Approximately 1 week later, the next round was started.

Supply Estimates
Data regarding the BCOP workforce from 2008 through 2014 were compiled from BPS and ASHP data.18-25 Three variables were tracked for each year: the number of PGY2 oncology residencies filled, the number of new BCOPs, and the total number of BCOPs (Appendix Table A1). These variables were chosen because they reflect the pipeline for oncology practice training and known information about the BCOP workforce. For each variable, the size of the cohort was plotted over time. Data about BCOPs attempting recertification were excluded from the estimates. In 2014, nine of 41 attempts at recertification were unsuccessful.18 The rationale for not including these data were uncertainty regarding whether pharmacists will recertify at some point and rejoin the BCOP cohort. International BCOPs, however, were included because there were no reliable data regarding their location or current licensure status. Data on the number of BCOPs who would leave the workforce through retirement, death, or change of occupation were not available.

Time trend equations (linear and nonlinear) were examined for best fit to the data for each of the three variables using Excel 2007 and SAS (SAS/STAT User’s Guide, Version 9.2; SAS Institute, Cary, NC; SAS OnlineDoc Version 8, Ch 8). The equations that resulted were used to estimate values for the variables through 2020 by using the SAS AUTOREG procedure and a maximum likelihood approach. The maximum likelihood method is generally preferred in favor of ordinary least squares approach when working with time series data because it provides more robust handling of autoregressive errors.26 In addition, linear trend lines were plotted for the 95% lower and upper confidence limits and were extrapolated into time as an estimate of likely ranges for each variable.

Estimating BCOP Annual Patient Visits Through 2020
Annual patient visits were calculated separately for academicand office-based BCOPs as the AAMC Study found that oncology physicians in the academic setting saw approximately one half as many patients per week as did office-based physicians.3 The total annual patient visits were estimated using a modified method similar to that used in the AAMC Study. (Total annual patient visits = [total BCOPs × patient visits per week per BCOP] × 48 weeks × 0.85) where total BCOPs were derived from BPS data; patient visits per week per BCOP was the average reported by Delphi panelists by practice site (academic or office based); 48 weeks is the average number of weeks worked each year; and 0.85 is a correction factor taken from the AAMC study methods that relates to other activities that reduce time for patient care, such as drug
distribution, administrative duties, and teaching.) The separate estimates for academic- and office-based BCOPs resulted in a range that depended on practice setting.

RESULTS

Delphi Panel Characteristics
Thirteen (87%) of 15 oncology pharmacists who were invited to participate in the study accepted the invitation. Characteristics of these panelists are listed in Table 1. The panelist response rates for Round 1 and Round 2 were both 100%.

BCOP Functions
Table 2 describes the top 13 services identified through the Delphi process, most of which are tested for in the BCOP certification exam. Eight services met the consensus criterion of being identified by ≥ 80% of panelists as those frequently or often provided by BCOPs. These services were put forth as contributions that BCOPs can reliably make to oncology patient visits. Three other services were cited by ≥ 60% of panelists as being offered frequently or often.

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<tr>
<td>Hold or have held BCOP status</td>
</tr>
<tr>
<td>Experience, years</td>
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<tr>
<td>PGY2 oncology pharmacy residency</td>
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<tr>
<td>PGY1 pharmacy residency</td>
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Abbreviations: BCOP, Board-certified oncology pharmacist; PGY1, postgraduate year 1; PGY2, postgraduate year 2; SD, standard deviation.

<table>
<thead>
<tr>
<th>Table 2. Services Identified by 13 Delphi Panelists as Provided by BCOPs Frequently or Often</th>
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<tbody>
<tr>
<td>Service</td>
</tr>
<tr>
<td>Participating in clinical studies</td>
</tr>
<tr>
<td>Adjusting chemotherapy</td>
</tr>
<tr>
<td>Assessing chemotherapy response and/or toxicity</td>
</tr>
<tr>
<td>Managing nausea, vomiting, and antiemetic therapy</td>
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<tr>
<td>Managing symptoms and providing supportive care</td>
</tr>
<tr>
<td>Providing patient counseling and education</td>
</tr>
<tr>
<td>Pain management</td>
</tr>
<tr>
<td>Participating in protocol-based initiatives</td>
</tr>
<tr>
<td>Managing or administering growth factor(s)</td>
</tr>
<tr>
<td>Assisting with new patient consults*</td>
</tr>
<tr>
<td>Medication reconciliation</td>
</tr>
<tr>
<td>Managing anticoagulation therapy</td>
</tr>
<tr>
<td>Ordering routine chemotherapy*</td>
</tr>
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Abbreviation: BCOP, Board-certified oncology pharmacist.
*AAMC study lists these advanced practices for physician assistants and nurse practitioners.

BCOP Patient Visits per Week
Delphi panelists in both groups reported the average time spent per visit as 30 minutes. The high level of agreement regarding visit length led us to adopt a 30-minute standard for patient visits in both settings. Panelists from academic practice settings reported 35 pharmacist visits per week, whereas panelists from office-based settings reported 47 visits per week, which is similar to the findings for oncology physicians in the AAMC study.3 These differences led us to retain two distinct cohorts in our analyses and projections.

The considerable variation in reported patient visits per week was partially explained by Delphi panel responses. Panelists who reported the number of visits per week to be
greater than average cited exceptionally busy practices, high daily census, and longer work days as reasons for the greater volume. Panelists who reported the number of visits to be less than average cited other responsibilities (administrative, academic, and/or student mentoring), only working with specific patients (new patients receiving chemotherapy on cycle 1), and a lack of a full week coverage on the service as reasons for the lower volume. These patterns are likely to persist. Because of the wide variation in availability, we conducted sensitivity analyses at the 75% and 50% availability levels.

**PGY2 Oncology Residency, New BCOP, and Total BCOP Supply Data**

Figure 1 shows 2008 to 2014 actual values and 2020 projections for three variables. Linear trend lines are shown to reflect the data fit. Figure 1 also shows trend line equations, including the correlation coefficient squared ($R^2$) values. All trend lines are linear. The trend equations were used to project 2020 estimates for each variable. All projected values remained within the extrapolated 95% confidence limit trend lines.

Most panelists agreed or strongly agreed with the projections in Figure 1: 75% growth for residencies and 62% for new BCOPs and total BCOPs. The remaining panelists were neutral (25%, 31%, and 31% respectively) or disagreed or strongly disagreed (0%, 8%, and 8% respectively). Reservations included the lack of knowledge regarding the future practice location of international BCOPs and whether employers would require oncology pharmacists to have a BPS oncology certification.

**Estimated BCOP Annual Patient Visits Through 2020**

Using AAMC Study methods (see “Estimating BCOP Annual Patient Visits Through 2020”) for academic or office-based practice, an estimated range of approximately 3.0 to 4.0 million 30-minute patient visits were available in 2015 and approximately 5.0 to 7.0 million in 2020. The possibility of BCOPs practicing only in a hospital setting, outside the United States, totally in administrative roles, and other considerations would yield fewer available visits: 2.2 to 3.3 million (2015) and 3.9 to 5.2 million (2020) at 75% availability, and 1.5 to 2.0 million (2015) and 2.5 to 3.5 million (2020) at 50% availability. Even under these conservative assumptions, the potential exists for BCOPs to substantially decrease the shortfall in patient visits.

**DISCUSSION**

**Delphi Process and Clinical Services**

We used the Delphi process to identify specific services that BCOPs could contribute to oncology patient visits. Following the recommendation that research that involves the Delphi process report the definition of consensus, we arbitrarily chose $\geq 80\%$ agreement to define consensus. However, we note that several services were frequently or often offered by $\geq 50\%$ of BCOPs and might, therefore, be considered.

**FIG 1.** Filled postgraduate year 2 (PGY2) oncology residency positions, new (first-time) Board-certified oncology pharmacist (BCOP) examination passers, and total BCOPs: 2008 to 2014. Adapted from National Pharmacy Residency Match Data with permission from American Society of Health-System Pharmacists.
Despite 10 of 13 panelists practicing in an academic setting, there was a high degree of consensus (Table 2) regarding eight clinical services that BCOPs could contribute to oncology patient care and visits. The list of clinical services could differ if the Delphi panel included other practitioners, such as oncologists. Table 2 also illustrates that services for which BCOPs have training and experience, in some cases, are distinctly different from those of other NPPs. This finding suggests that BCOP pharmacists could provide services that are complementary to those offered by other NPPs and could expand the range of services potentially offered by a team. On the basis of these findings, we suggest that BCOPs could add value to patient care teams.

**PGY2 Oncology Residencies**

The Delphi panel agreed that PGY2 oncology residency positions will continue to grow and be filled through 2020, a finding that is supported by recent data that, in 2015, 93% of available PGY2 oncology residency positions were filled. Panelists cited the increasing competition for residency programs as supporting this trend. Increasing numbers of pharmacists completing PGY2 oncology residencies should continue to add to the number of potential candidates for the BPS oncology certification examination.

**New BCOPs**

Although projections suggest that PGY2 oncology residencies account for approximately 62% of new BCOPs annually, estimated new BCOPs from 2008 to 2014 are consistently higher than the number of filled PGY2 residencies. Growth patterns suggest that the BCOP cohort is growing faster than are PGY2 residencies. These findings suggest that pharmacists are pursuing BPS certification with training avenues that are different than accredited PGY2 oncology residencies. From the available data, we cannot determine how many new BCOPs may have completed unaccredited oncology residencies or achieved BPS certification eligibility through practice experience.

Panelists observed that there are factors that work both for and against pharmacists seeking BPS certification in oncology. On one hand, an increasing emphasis on credentialing and the dynamics of team-driven patient care both favor individual pharmacists carrying the highest possible specialty certification. On the other hand, if there is no salary differential or if the practice site is willing to have pharmacists practice in specialty areas without Board certification, pharmacists may choose to not pursue the examination or to allow their certification to lapse.

**Total BCOPs**

Projections regarding total BCOPs through 2020 were highly linear and CIs were fairly narrow, which suggests that these projections have a solid foundation; however, Delphi panelists noted that international BCOPs were included in the data sets even though they may not contribute to potential patient visits in the United States. In 2014, approximately 16% of the BCOP population was listed by the BPS as being located outside the United States. Although the rationale for including them is that BPS does not report licensure data about exam takers, the inclusion of international BCOPs likely results in an overestimate of the total BCOP cohort size. In addition, we could not estimate how many BCOPs would separate from the workforce through retirement, death, or change of occupation because these data were not available, which potentially caused overestimation. We note, however, that as the BPS oncology certification exam was first offered in 2005, the BCOP population is relatively young. Thus, the number leaving the workforce for these reasons would likely be small.

The AAMC Study—based formula to estimate visits, which included an 85% use factor to account for time not spent on patient visits, predicted 5 to 7 million patient visits available by 2020. Sensitivity analysis on the basis of factors that could further reduce visit availability still resulted in a significant number of potential visits (2.5 to 3.3 million) by 2020 with the addition of BCOPs to the health care team.

In conclusion, BCOPs can provide clinical services that could yield a substantial number of patient visits and could potentially contribute to reducing the shortage of oncology patient visits. An expert panel came to consensus on eight clinical services that are performed frequently or often by BCOPs. These services partially overlap but also complement the activities and services provided by other NPPs. The population of BCOPs is expected to continue growing through 2020, with about 62% of the new BCOP workforce having completed PGY2 oncology pharmacy residencies. Our findings suggest that oncology pharmacists could potentially increase patient visit capacity and could be added to other NPPs who provide clinical services to oncology patients.

**Acknowledgment**

This work was supported by Touro University California. We acknowledge the consultation of Timothy Tyler, MD, Comprehensive Cancer Center, Desert Regional Medical Center, and Joseph Hill, Director of the Government Relations Division and Douglas Schecklerhoff, Vice President, Office of Practice Advancement, American Society of Health-System Pharmacists. We also thank William Ellis, Executive Director, Board of Pharmacy Specialties.
AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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No relationship to disclose

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No relationship to disclose

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Travel, Accommodations, Expenses: Tesaro

Steve D’Amato
Honoraria: Merck, Takeda Pharmaceuticals, Eli Lilly, Celgene, Amgen, Genentech
Consulting or Advisory Role: ION Pharma, Eli Lilly, Celgene
Speakers’ Bureau: Merck, Takeda Pharmaceuticals, Eli Lilly, Celgene, Amgen, Genentech

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Appendix

Delphi Panel Process and Objectives

For this study, a Delphi process was used to identify services that Board-certified oncology pharmacists (BCOPs) could most reliably contribute to oncology patient care and to estimate how many patient visits BCOPs could provide. Delphi processes involve the use of experts to develop consensus through a process of iteration and feedback.1,3,4 Experts provide responses to questions and/or problems that are shared with fellow experts. Generally, consensus develops as questions and feedback go through a series of iterations or rounds. The Delphi process is particularly useful when sufficient data are not available to predict outcomes.15 For the purpose of this study, consensus was defined as ≥ 80% of the panel reaching agreement for clinical services and convergence of responses for Likert scale items.16

Fifteen oncology pharmacists, recognized as leaders in the field, were invited to serve as Delphi panelists. The Delphi process was explained to the potential panelists before beginning the iterative process.

Round 1

A Round 1 survey asked each panelist to respond to questions in four sections.

Section 1.1. The frequency of BCOP activity (frequently, occasionally, and rarely/never) for the three services: assisting with new patient consults, ordering routine chemotherapy, and performing invasive procedures. These services were identified in the American Association of Medical Colleges Study as clinical contributions that nonphysician practitioners could make.3

Section 1.2. Other activities and functions that BCOPs could contribute to oncology patient care were reported as open-ended comments.

Section 1.3. The estimated length of an average patient visit and the estimated number of patient visits each week. On the basis of the American Association of Medical Colleges Study, panelists were asked to identify their practice site as academic or office based.

Section 1.4. The level of agreement with the estimated supply projections for postgraduate year 2 oncology residencies, new BCOPs, and the total BCOP workforce. Panelists responded with open-ended comments. The comments were used to identify limitations of the study.

Reminder e-mails were sent to panelists at approximately 2-week intervals. After 5 weeks, responses from Round 1 were compiled, summarized, and sent to the panelists for their review.

Round 2

A second survey (Round 2) was sent approximately 3 weeks after panelists received the results of Round 1. The goal of the Round 2 survey was to develop consensus around Round 1 responses. This survey included four sections.

Section 2.1. The goal for this section was to develop a consensus list of services that BCOPs performed frequently or often. During Round 1, panelists were given the opportunity to comment on the vocabulary describing services, and these comments were shared in the Round 1 report. This was done to facilitate a common understanding of what each service entailed. We used the comments to refine the description of each service. In the final list, we combined the three services from Section 1.1 (Round 1) with an additional 12 services most often mentioned in Section 1.2 responses (Round 1). The functions were listed in alphabetical order. Panelists were asked to answer yes/no to each of the 15 services on the basis of whether that function was frequently or often performed by BCOPs.

Section 2.2. The goal for this section was to develop a better understanding of the variability of average number of visits weekly in Round 1. Panelists were asked to identify their practice setting as academic or office based, and on the basis of comparing their patient visits per week with average values for visits to comment on why their estimates were different from the average.

Section 2.3. The goal of this section was to measure consensus regarding the Round 1 comments on projections regarding the future supply of postgraduate year 2 oncology residencies, new BCOPs, and total BCOPs. Panelists were asked to indicate their level of agreement with the supply projections for each of the three variables and with three limitations related to interpreting the data using a five-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree). The limitations were drawn from panelist comments. Lastly, the panelists were offered the opportunity to comment on their responses.

Round 2 reminder e-mails were sent to panelists at approximately 2-weeks intervals. After approximately 5 weeks, responses from Round 2 were compiled, summarized, and sent to the panelists for their review. A description of the study, including results and discussion, was prepared and panelists were invited to review and comment on the final report. Panelists who elected to participate in the last step were invited to coauthor the paper.
Table A1. Projections for Three Variables on the Basis of Data From 2008 to 2014

<table>
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<th>Year</th>
<th>Estimated Filled PGY2 Residency Positions (extrapolated 95% CI)</th>
<th>Estimated New BCOPs (extrapolated 95% CI)</th>
<th>Estimated Total BCOP (extrapolated 95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>126 (124 to 127)</td>
<td>213 (186 to 278)</td>
<td>2,081 (1,927 to 2,665)</td>
</tr>
<tr>
<td>2016</td>
<td>138 (137 to 139)</td>
<td>231 (209 to 294)</td>
<td>2,325 (2,212 to 2,870)</td>
</tr>
<tr>
<td>2017</td>
<td>151 (150 to 152)</td>
<td>249 (232 to 310)</td>
<td>2,599 (2,299 to 3,075)</td>
</tr>
<tr>
<td>2018</td>
<td>163 (162 to 164)</td>
<td>267 (255 to 326)</td>
<td>2,907 (2,484 to 3,280)</td>
</tr>
<tr>
<td>2019</td>
<td>176 (173 to 178)</td>
<td>285 (278 to 342)</td>
<td>3,252 (2,670 to 3,486)</td>
</tr>
<tr>
<td>2020</td>
<td>188 (185 to 192)</td>
<td>303 (301 to 357)</td>
<td>3,639 (2,855 to 3,691)</td>
</tr>
</tbody>
</table>

Abbreviations: BCOP, Board-certified oncology pharmacist; PGY2, postgraduate year 2.