Trends in the delivery of care to oncology patients in the United States: Emphasis on the role pharmacists on the healthcare team

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Abstract
Objective: The purpose of this study was to identify trends in oncology care that allow one to forecast workforce supply and demand, the training and skills needed by the oncology pharmacist for the likely future of oncology care.

Methods: Interviews were conducted with experienced oncology pharmacists in leadership roles at 20 organizations balanced by geographic region and type of practice site (academic or community/ambulatory). Results were analyzed using descriptive statistics and theme identification.

Results: Practice sites differed widely in numbers of patient visits, practitioner/patient ratios, residency program presence, and other structural features. Despite this, the majority reported an expectation of growth in cancer patients, oncology physicians, oncology pharmacists, pharmacy technicians, oncology nurses, and advanced practice practitioners in the next two to five years. Fifty percent of sites currently support Post Graduate Year 2 (PGY2) oncology residencies. At least 50% reported routine pharmacist involvement in 12 clinical functions. More future involvement was predicted for immunotherapy (80%) and oral oncolytic therapy (90%). Interprofessional involvement was reported for a broad variety of practice-related committees and patient education teams. Limited pharmacist involvement in credentialing, quality measurement, and value-based reimbursement systems was found.

Conclusion: Anticipated increases in demand for oncology pharmacists strongly suggest the need for more PGY2 oncology residency programs and on-the-job oncology training programs. Oncology pharmacists are currently involved in many clinical and administrative functions including multidisciplinary management. While a core set of clinical functions has been identified, oncology pharmacists must prepare for the increased use of oral oncology agents and immunotherapy. Pharmacist involvement in value-based reimbursement and other data-based quality outcome measurements should be increased to optimize involvement in team-based patient care.

Keywords
Oncology pharmacists, role in oncology care, trends in oncology pharmacy practice

Date received: 30 July 2019; revised: 28 January 2020; accepted: 28 January 2020

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Background and significance

Several articles are published in the scientific literature that allude to the important role of the oncology pharmacist in providing care to patients with cancer.\(^1,2\) The Hematology/Oncology Pharmacy Association (HOPA), a national organization for oncology pharmacy practitioners, has published a scope-of-practice document that highlights the skills possessed by oncology pharmacists and the level of practice that can be offered to a healthcare team to enhance the care of patients with cancer.\(^3\) Clinical roles of oncology pharmacists in the healthcare setting have been reviewed.\(^4\) One study showed that in the face of a predicted shortage of nearly 2500 oncologists and approximately 10 million patient visits, oncology pharmacists may play a vital role in providing clinical services to patients with cancer that could narrow the gap in patient visits by three to five million cancer patients annually.\(^5\) The same study showed that oncology pharmacists were involved in clinical trials, adjusting chemotherapy, assessing chemotherapy response and toxicity, managing chemotherapy-induced nausea and vomiting, managing patient’s symptoms and providing supportive care, providing patient counseling and education, pain management, and participating in protocol-based initiatives. The same study also noted large differences in visits per year between academic and ambulatory/community organizations.\(^5\) Because of the wide variability in practices, it is important that we continue to assess pharmacist involvement in oncology care so that gaps in care may be addressed.

Advanced training in the clinical arena has traditionally occurred through pharmacy residencies. The American Society of Health-System Pharmacists (ASHP) accredits pharmacy residency programs based on rigorous standards.\(^6\) Currently, ASHP accredits two tiers of residency programs: Post-Graduate Year 1 (PGY1) pharmacy residencies and Post-Graduate Year 2 (PGY2) specialized residencies (including oncology).\(^6,7\) In 2019, ASHP listed 110 accredited PGY2 oncology residencies.\(^8\) Oncology programs utilize PGY2 specialty residents for teaching and service. To what extent they provide value has not been studied. We explored growth trends in oncology patients to estimate whether more or expanded programs might be needed to satisfy the demand created by any increase in cancer patient visits.

Another important question in health care is how to best utilize the skills of the oncology pharmacist onto the team caring for patients with cancer. Holle et al. showed that under the terms of a collaborative practice agreement, oncology pharmacists performed activities including adjusting medication, ordering chemotherapy, interpreting and monitoring lab tests, developing therapeutic plans, and educating patients.\(^4\) In addition, responders to their survey of oncology pharmacists stated that they were actively involved in a Medication Therapy Management program and an Oral Chemotherapy (OC) program.\(^4\) Battis et al. purported that oncology pharmacists are most effective when they act within a collaborative practice agreement.\(^9\) The Battis et al. study recommended that all prescriptions in an OC program be reviewed by the oncology pharmacist before being filled.\(^6\) However, barriers to proactive prescription review exist, as the oncology pharmacist may not capture these prescriptions prior to patient receipt or prior to e-prescribing. These studies demonstrate the utility of pharmacists in the care of the oncology patient; however, more robust data are needed for the purpose of characterizing current practices for benchmarking. To better define trends in cancer care among oncology pharmacists, we conducted a study surveying oncology pharmacists in a variety of oncology settings.

One obstacle to increasing pharmacist presence on care teams has been reimbursement.\(^4\) To address this issue, we investigated payment models at participating organizations. One model of particular interest was the Center for Medicare and Medicaid-sponsored Oncology Care Model (OCM) which provides reimbursement based on quality outcomes as well as cost savings.\(^10\)

Purpose

The purpose of this study was to identify trends in oncology care that allow one to forecast workforce supply and demand, the training and skills needed by the oncology pharmacist for the likely future of oncology care.

Methods

An exploratory 49-item survey (available as online Appendix A) including quantitative and qualitative questions was developed by a HOPA team of oncology pharmacy practitioners and researchers. Survey items asked about the organization’s current size, staffing patterns, residency training programs, capacity to provide oncology visits, activities of pharmacists and pharmacy technicians, outcome metrics, payment models, and the use of technology. Interviewees were also asked about foreseeable trends in oncology care over the next two to five years at their practice site related to these same topic areas. Survey questions were developed from the review by Holle et al.\(^4\) The State of Cancer Care in America, 2017, and from a literature search on trends in both oncology pharmacy and oncology practice in the United States.\(^4,11\)
The interview-based survey was designed to take approximately 45 min to complete with a team member conducting the interview. The survey was beta-tested by six oncology pharmacists in leadership roles and representing different organizations to identify and clarify ambiguous items. We updated our survey based on results from beta-testing including rewording some questions and adding several questions. Beta-test respondents were then asked to answer the new questions.

We identified organizations with practicing oncology pharmacists from a list of National Cancer Institute (NCI)-designated treatment centers and organizations with PGY2 oncology residency programs. Sixty-four organizations throughout the United States (US) were stratified by geographic region based on US Census designation (Northeast, South, Midwest, and West) and by practice type (academic or community/ambulatory). We aimed to select three organizations in community/ambulatory care settings for every two organizations in academic centers, since more oncology patients are treated in community settings. From the 64 organizations originally drafted, we created a list of 20 organizations that were balanced by geographic region and by type. An experienced, practicing oncology pharmacist leader from each organization was invited to participate. If an organization was unable to participate, another organization with the same region and practice type was invited to participate. The selection process continued until a total of 20 participants completed the survey.

The interview survey was administered by phone. There was no remuneration to the interviewees. Interviewees received the survey items by email several days before the telephone interview. One team member conducted the telephone survey, while two other team members acted as scribes. The scribes submitted reports that were reviewed for consistency. Final reports were entered into an electronic platform (Qualtrics, Provo, UT and Seattle, WA) by an interview team member.

The results of the interviews were exported from the Qualtrics database and the data analyzed in Microsoft Excel. Descriptive statistics were used to describe numeric data. Twenty-three questions were open ended. For these questions, respondents could give as many answers as they chose. Answers were categorized by keywords and themes. The frequency of answers for themes was reported and examples are given. The results were analyzed by sections: demographics, current activities, prospective trends, and documentation and value with subset analysis by geographic region and type of organization for some variables. The authors attempted to identify consensus areas and trends.

Results
We completed 20 interviews with the desired regional and organization type distribution between November 2017 and August 2018. The participating organizations were diverse ranging from large urban organizations to rural-based community oncology organizations. All oncology pharmacists who were interviewed had at least five years of experience. The interviews averaged about 60 min but ranged from 45 to 90 min in length. Some questions required follow-up because the interviewee did not have the information readily available, and in some cases, information was not obtainable. For those items where <20 interviewees responded, the number and percent responding are reported.

Demographics
Table 1 shows the main characteristics stratified by the type of organization. The average productivity as measured by mean visits per year was similar across academic and community settings, but the range was very large for both settings. Likewise, the mean physicians per 10,000 visits was similar but also had a large range. Although the ratio of physicians to pharmacists was greater in the community setting, we did not perform comparative statistics on these data. Academic organizations were more likely to have post-graduate year 2 (PGY2) oncology pharmacy residencies, while credentialing, privileging and employment requirements for advanced training were similar between settings and low in prevalence overall. The most commonly mentioned “special” feature of organizations was the presence of a bone marrow transplant service and was similar in both settings. Nineteen of 20 organizations reported fee-for-service as the principal payment model. Four of 20 are participating in the OCM, a Federal program where reimbursement is based on quality measures. Thirteen of 20 organizations reported ≥50% of their patient population with Medicare/Medicaid as their primary payer.

The characteristics of the 20 organizations are described by geographic region in Table 2. Ten organizations reported having 20 total PGY2 oncology pharmacy residents. The distribution of residents was similar across geographic regions. The presence of credentialing or privileging systems was relatively low in all regions (0% to 40%). Currently, the variability in the participating organizations (Tables 1 and 2) suggests that across the United States, oncology care organizations have not adopted similar practice models.
More than half of the oncology pharmacists interviewed reported that an oncology pharmacist role had been in their organization for more than 20 years. Clinical activities that oncology pharmacists perform regularly at the time the survey was conducted are reported in Table 3. We observed a high level of agreement between the interviewee responses and current clinical functions cited in a 2017 Delphi study. While 95% of institutions reported having pharmacists provide patient education, a small number also reported that providing patient education is shared with nurses, oncologists, nurse practitioners, physician assistants and/or others. Only 50% reported participating in collaborative practice agreements with oncologists.

In addition to patient-focused clinical functions and activities, participants currently participate in a broad range of multidisciplinary committees. More than 40% of oncology pharmacists surveyed reported engagement in Pharmacy & Therapeutics (P&T), quality...
improvement, policies and order sets, research-based, and disease state working group committees. Other frequently reported multidisciplinary committees included workflow, medication safety, oncology-focused P&T, patient education, general medicine, nursing-pharmacy, information technology, and leadership committees. We did not observe substantive differences between academic and community/ambulatory practice organizations in terms of having pharmacists represented at multidisciplinary meetings in their respective practice sites.

When asked if pharmacists provide any additional clinical functions as part of their current activities, responders most commonly listed research involvement and other clinical activities such as follow-up calls and clinical pathway involvement. When asked if oncology pharmacists call patients to address questions or concerns that might occur between patient appointments, 14 of 18 (78%) responded “yes” and 3 of 18 (17%) responded “sometimes.” When asked what additional changes they might foresee in their practice, responders most commonly cited expanding pharmacist services, patient visits, and oral chemotherapy involvement. Table 4 shows the reported broad involvement of oncology pharmacists in educating fellow health professionals about oncology issues. While working with pharmacy students, residents, and other pharmacists would be expected, we noted the high percentage of oncology pharmacists providing education for oncologists, oncology fellows, and nurses.

**Prospective trends**

Future trends in oncology practice were a focus of the survey, which required respondents to consider two to five years into the future. Respondents indicated that the size of their oncology operation, patient volume, and health care provider numbers including navigators would grow (Table 5). We also assessed potential future trends in technology, as it related to oncology practice. Of the completed surveys, 17 pharmacists (85%) reported 40 anticipated changes in technology in the next two to five years. The use of oncology pathways and cameras and/or gravimetric analysis in medication compounding was frequently reported. These changes were grouped to include enhancements to patient care (43%), pharmacy automation (38%), bar code medication administration (8%), electronic

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**Table 3.** Clinical functions or activities performed frequently or often by oncology pharmacists.

<table>
<thead>
<tr>
<th>Function/activity</th>
<th>Number (%)</th>
</tr>
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<tbody>
<tr>
<td>Participate in protocol-based initiatives</td>
<td>20 (100)*</td>
</tr>
<tr>
<td>Assess toxicity due to chemotherapy</td>
<td>19 (95)*</td>
</tr>
<tr>
<td>Manage chemotherapy-induced nausea and vomiting</td>
<td>19 (95)*</td>
</tr>
<tr>
<td>Provide recommendations regarding symptoms of disease or toxicity</td>
<td>19 (95)*</td>
</tr>
<tr>
<td>Perform direct patient counseling/education</td>
<td>19 (95)*</td>
</tr>
<tr>
<td>Manage or provide recommendations regarding cancer pain</td>
<td>17 (85)*</td>
</tr>
<tr>
<td>Draft written or electronic chemotherapy orders including for prophylactic agents (e.g. antiemetics, corticosteroids, etc.)</td>
<td>16 (80)</td>
</tr>
<tr>
<td>Adjust chemotherapy</td>
<td>15 (75)*</td>
</tr>
<tr>
<td>Other (e.g. Clinical trial involvement, anticoagulation)</td>
<td>13 (65)*</td>
</tr>
<tr>
<td>Assess response to chemotherapy</td>
<td>12 (60)*</td>
</tr>
<tr>
<td>Interpreting pharmacogenetics reports or therapies that rely on pharmacogenetics/-genomic information</td>
<td>11 (55)</td>
</tr>
<tr>
<td>Participate in collaborative practice agreements</td>
<td>10 (50)</td>
</tr>
</tbody>
</table>

*These functions/activities were identified as consensus items (>80% agreement) in an earlier Delphi study.⁴

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**Table 4.** Education of other healthcare professionals by oncology pharmacists.⁴

<table>
<thead>
<tr>
<th>Health professional group</th>
<th>Number N=18 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other pharmacists</td>
<td>18 (100)</td>
</tr>
<tr>
<td>Oncologists/fellows</td>
<td>17 (94)</td>
</tr>
<tr>
<td>Pharmacy students</td>
<td>17 (94)</td>
</tr>
<tr>
<td>Oncology nurses</td>
<td>16 (89)</td>
</tr>
<tr>
<td>Patients/caregivers</td>
<td>16 (89)</td>
</tr>
<tr>
<td>PGY 1 pharmacy residents</td>
<td>12 (67)</td>
</tr>
</tbody>
</table>

*Education of groups reported in ≥65% of participants included. PGY2 Oncology residents are assumed to be part of the oncology pharmacist team completing the education.

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**Table 5.** Prospective trends anticipated.

<table>
<thead>
<tr>
<th>Trends in the next 2–5 years</th>
<th>Number responding “more” (%)⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth trends</td>
<td></td>
</tr>
<tr>
<td>Oncology patients</td>
<td>17 of 17 (100)</td>
</tr>
<tr>
<td>Oncology pharmacists</td>
<td>16 of 17 (94)</td>
</tr>
<tr>
<td>Pharmacy technicians</td>
<td>15 of 20 (75)</td>
</tr>
<tr>
<td>Oncology nurses</td>
<td>14 of 18 (78)</td>
</tr>
<tr>
<td>Oncology physicians</td>
<td>13 of 17 (76)</td>
</tr>
<tr>
<td>Advanced practice providers</td>
<td>13 of 17 (76)</td>
</tr>
<tr>
<td>Therapy trends</td>
<td></td>
</tr>
<tr>
<td>Use of oral oncolytic agents</td>
<td>18/20 (90)</td>
</tr>
<tr>
<td>Use of immunologic agents</td>
<td>16/20 (80)</td>
</tr>
</tbody>
</table>

*In some cases, interviewees did not provide a response.
health record-related (8%), inventory (3%), and analytics (3%).

Pharmacists were also asked about anticipated changes for the future management of patients receiving oral oncolytic therapy and immunotherapy (Tables 1 and 5). Interviewees indicated that changes are expected at almost all practices (90% and 80%, respectively), in the areas of program initiation or expansion, software support, or use of quality metrics. Finally, the survey asked about trends in benchmarking and value-based measures. Only 35% of responses indicated that benchmarking and value-based measures are currently used in pharmacy practice, while 84% of responses indicated that these will impact future practice.

Potential changes to the roles of pharmacy technicians were also explored. Many practices (n = 11 of 18, 61%) indicated that the role of the pharmacy technician may change with a “yes” or “maybe” response. Within these practices, 26 responses for future pharmacy technician roles were provided. Roles within internal pharmacy processes such as inventory or robotics were reported most frequently (n = 11 times, followed by direct patient care activities such as medication reconciliation or smoking cessation (n = 7 times), patient assistance (n = 5 times), quality assurance (n = 2 times), and technology (n = 1 time).

The future of PGY2 oncology residency training was also addressed in the survey. Ten organizations reported currently having an oncology residency program, and 5 organizations anticipated starting a PGY2 oncology residency program. The majority (n = 9 of 10; 90%) of current PGY2 oncology programs anticipated making changes to current programs and many (n = 6 of 9; 67%) planned to add additional positions. Other areas for change included adding additional content from 13 reported areas including finance/management, informatics, pharmacogenomics, allogeneic transplant, and others.

**Documentation of services**

Interviewees were asked about how they assess the quality and value of pharmacy services. They responded that various metrics are used but that it is a challenge to collect them. Cost savings on initiatives was the most frequently reported metric (Figure 1). This is consistent with the current practice of using patient volume and cost savings to justify positions. The other responses provided included various ways to measure patient volumes (e.g. patients counseled, wait times, volumes of patients seen). In looking toward the future, more consideration for outcomes-based metrics such as avoidance of an emergency department or hospital admission is likely.

As the role of clinical oncology pharmacist expands, the metrics to justify new pharmacy full-time employees (FTEs) will evolve. When 20 different institutions were asked what metrics they were interested in using to justify a new pharmacy FTE, the most frequently reported included cost savings and oncology pharmacist to patient load ratio, followed by improved outcomes due to pharmacy monitoring (Figure 2).

![Figure 1](image_url). Metric collected and used to assess the quality and value of pharmacy services (n = 20).

*Other: Various comments were offered and included cost savings, increased workload in processing orders, infusion time, saving physician time in seeing patients, medication utilization evaluations, patient and physician satisfaction, moving inpatient regimens to outpatient regimens, medication errors caught, transition of care, research.
A common theme among the metrics reported is the difficulty in obtaining data.

**Discussion**

This qualitative and quantitative study included interviews with 20 experienced oncology pharmacist leaders in organizations that were balanced by geographic region and either academic or community/ambulatory types of practice. Despite balancing the interviews, 20 of them cannot be purported to represent all organizations caring for patients with cancer in the United States. Rather, the data may serve as an insight into baseline characteristics of current oncology practices and trends to be expected in the next two to five years with emphasis on the roles of oncology pharmacists. It is hoped that these findings will support future oncology pharmacist and multidisciplinary research leading to enhanced oncology care, lower costs, and improved outcomes for patients with cancer.

While we found great variation in the size, organizational structure, and other characteristics of the 20 sites studied (Table 1), a high percentage of respondents commonly predicted a future characterized by more patients, more oncology physicians, more oncology pharmacists, more pharmacy technicians, more oncology nurses, and more advanced practice practitioners. In other words, with an increasing number of patients, there will be increased demand for all members of the oncology care team including pharmacists.

For pharmacists, the supply chain needed to support increased demand for oncology pharmacists extends back to having sufficient PharmD graduates and enough PGY1 and PGY2 residencies and on-the-job training opportunities focused in oncology practice settings. From this study, data regarding PGY2 oncology residencies showed that only 50% of the 20 practices supported a PGY2 oncology residency program. Further, academic sites sponsored substantially more PGY2 oncology residency programs and residents (78% vs. 27% for programs and 75% vs. 25% for residents). To meet the anticipated future demand, we suggest that all oncology practices should work toward increasing PGY2 oncology residencies and that particular effort and support be directed toward community/ambulatory programs. Focused on-the-job training should be supported for expanding roles and for experienced pharmacists that need additional oncology knowledge and skills. Also, although not addressed in our survey, we anticipate that more board-certified oncology pharmacists will be needed to meet the future demands within the multidisciplinary oncology healthcare team.

Evidence was also provided that oncology pharmacists are already involved in team care through such activities as patient education, patient follow-up, and representation on a broad array of professional committees (Tables 1, 4 and 5). For two areas that are emerging today, the use of oral oncologic drugs and the use of immunotherapy, respondents strongly
predicted more pharmacist involvement in the next two to five years. Individuals also predicted more time managing patients, more involvement in pharmacogenetic/pharmacogenomic programs, expansion of clinic-based activities and expanded administrative activities. These specific needs add to the demand for more oncology-trained pharmacists in the future. Only 20% of organizations reported credentialing systems or requirements for advanced training and associated privileges, which suggests that these requirements are at an early stage of development. Leadership in implementing privileging and credentialing systems and/or training requirements may help oncology pharmacists attain expanded levels of responsibility on the care team.

This study also inquired about the role of the pharmacist in value-based care. Most pharmacists responded that benchmarking or value-based measures were not used in their organizations, while over 80% of pharmacists responded that these would have an impact on their practices. Under the Medicare Access and CHIP Reauthorization Act, organizations are required to report measures as part of participation with either the merit-based incentive payment system or an advanced alternative payment model such as the OCM. Survey responses that organizations are not using value-based or quality measures may indicate that pharmacists are not engaged in reporting, assessing, improving these measures. As suggested previously, pharmacists can have an impact on many quality measures. The lack of awareness and engagement noted in our survey represents a gap and opportunity for pharmacists to improve the quality of care for oncology patients by initiating quality-focused research and engaging in multidisciplinary quality improvement efforts.

Overall administration of the surveys was efficient, and the participants offered productive information. Although the survey process was unblinded, there may have been the possibility of interviewee bias. Interviewees may not have felt comfortable being totally honest if their comments reflected poorly on their organization or if they wanted to bolster their numbers in order to look better. Also, most of our interviewees received the survey in advance but some did not, which may have influenced their responses. Furthermore, committee members rotated in performing interviews and may have asked questions in a different manner. In analyzing data, it was realized that some open-ended questions may have been interpreted slightly differently between participants. Questions about numbers of pharmacists practicing in oncology areas were inclusive of all pharmacists regardless of responsibilities and included clinical, dispensing, administrative, and other roles. This distinction should be considered when evaluating information for possible benchmarking and the need for new oncology pharmacist positions. Finally, different organizations may have different pharmacist staffing needs based on multiple factors including type of services provided and acuity of patients.

One final consideration is that oncology practice continues to evolve quickly especially in the areas of new oral oncolytics, immunotherapies, and biosimilars. Additionally, value-based payment models have more recently become a major focus of organizations. This study spanned over two years and the organizations reporting have likely evolved in some of the areas reported in the survey, such as the advent of immunotherapy and its effect on value.

Conclusion

The anticipated growth in the number of cancer patients and new pharmacotherapies strongly suggest the need for more PGY2 oncology residency programs and on-the-job oncology training programs. Oncology pharmacists are currently involved in many clinical and administrative functions including multidisciplinary management. While a core set of clinical functions has been identified, oncology pharmacists must prepare for the increased use of oral oncology agents and immunotherapy. Pharmacist involvement in value-based reimbursement and other data-based quality outcome measurements should be increased to optimize involvement in team-based patient care.

This study reinforced earlier reports about clinical activities that pharmacists routinely perform in the United States and found that almost all these same functions are routinely performed by pharmacists in the 20 sites studied (Table 3). These findings provide increasing confidence regarding what pharmacists are contributing clinically to oncology care today. These activities also serve as a baseline for measuring what is needed to fulfill future practice trends. Overall, respondent agreement about the current clinical activities despite large variation in their organizational characteristics suggests that while a consensus care model for oncology patients in the United States has not yet emerged, we do have some confidence about how, what, and where pharmacists are contributing.

Acknowledgements

The authors and HOPA Board of Directors thank peer-reviewers Paul Cockrum, Stephen Harnicar, Ginah Nightingale, and Jolynn Sessions for thoughtful review and comments, and Sarah Tiwana and the HOPA staff for contributions to the editorial, project management, and publication phases of this project.
Declaration of Conflicting Interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Supplemental Material
Supplemental material for this article is available online.

References