

# Identifying the Contribution of Nurse Practitioners in the Care of Older Adults With Cancer

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**OBJECTIVES:** To identify the best available dataset that measured the number of nurse practitioners (NPs) and the type of care they provided; patient information, including malignancy type, age, and insurance status; and volume of procedures performed by NPs.

**SAMPLE & SETTING:** All available national datasets that included patients with cancer and provider types.

**METHODS & VARIABLES:** Using prespecified consensus-driven criteria, all available administrative datasets were reviewed. The authors evaluated four that met the inclusion criteria.

**RESULTS:** The authors' analysis identified the Surveillance, Epidemiology, and End Results (SEER) Program linked with Medicare claims dataset as the most appropriate to measure the contribution of NP-provided cancer care to older adults. The Chronic Conditions Data Warehouse was excluded because of the limited number of malignancies included in the data; the SEER-Medicare dataset included all malignancies.

**IMPLICATIONS FOR NURSING:** Evidence demonstrates that NPs provide an unknown amount of cancer care to older adults. Further research using the SEER-Medicare dataset may yield a solution to the health issue of insufficient oncologists to care for the growing older adult population. Workforce research informs future training needs and influences policymakers' decisions, making secondary data analyses in nursing particularly important.

**KEYWORDS** nurse practitioners; older adults; cancer care

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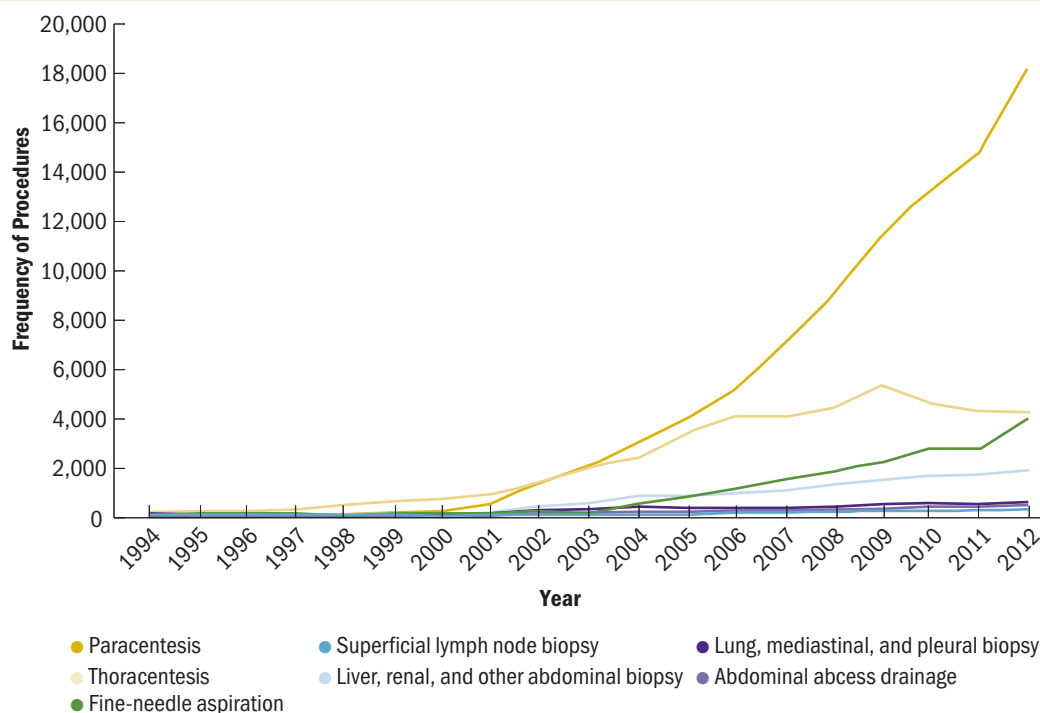
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About 40% of all Americans will be diagnosed with a malignancy in their lifetime (American Cancer Society, 2014). Cancer is most frequently diagnosed in adults aged older than 65 years (American Cancer Society, 2014), and the incidence is expected to increase dramatically from 2010 to 2050 (Weir, Thompson, Soman, Moller, & Leadbetter, 2015). Although some risk factors for cancer are modifiable, aging is not one of them. Unfortunately, the current oncology physician workforce is not enough to support the care for this large anticipated increase in patients with cancer (American Society of Clinical Oncology [ASCO], 2014). ASCO has projected a 40% growth in the demand for cancer care by 2025, with a physician supply growth of 25% (Yang et al., 2014). As the largest group of older adults doubles, the oncology practice community will have an inadequate number of oncologists to provide care.

Large administrative datasets have been used to measure the physician workforce, but they have not previously been used to measure nurse practitioner (NP) cancer care providers. A review of current literature demonstrates that NPs provide care to older adults (Chavez, Dwyer, & Ramelet, 2018), as well as cancer care (Friese et al., 2010; Hinkel et al., 2010; Ruegg, 2013), in a variety of settings (Britell, 2010; Buswell, Ponte, & Shulman, 2009; Hoffman, Tasota, Zullo, Scharfenberg, & Donahoe, 2005; Moote, Krsek, Kleinpell, & Todd, 2011; Moote, Nelson, Veltkamp, & Campbell, 2012). Most of these published studies relied entirely on self-reported data with very small sample sizes, limiting their utility and generalizability for a workforce analysis. To date, no studies have specifically examined the amount or type of cancer care NPs provide to older adults.

In the course of care for a malignancy, procedures are often done to diagnose or treat malignancies.

**FIGURE 1. Change of Frequency of Procedures From 1994 to 2012 for Medicare Beneficiaries**



**Note.** From “Expanding Roles of Nurse Practitioners and Physician Assistants as Providers of Nonvascular Invasive Radiology Procedures,” by R. Duszak et al., 2015, *Journal of the American College of Radiology*, 12, p. 286. Copyright 2015 by Elsevier. Reprinted with permission.

These procedures include bone marrow biopsies, paracentesis, and lumbar puncture, among others. From 2002 to 2012, procedures performed by NPs grew exponentially, as Figure 1 demonstrates. According to Medicare claims data, no paracentesis was performed by NPs in 1994; by 2012, Medicare had reimbursed claims for 18,000 procedures completed by an NP or physician assistant (Duszak et al., 2015). Patient outcomes associated with the procedures have remained stable or improved as the number of interventional procedures performed by NPs has increased (Gilani et al., 2009; Murphy et al., 2014).

### Objectives

Because older adults are the largest group of individuals diagnosed with cancer, and this group will double within the next 20 years (Ortman, Velkoff, & Hogan, 2014), the goal of this evaluation was to identify the most comprehensive dataset that could be used to measure NP cancer care for older adults. The criteria for analysis were identified by consensus in collaboration with a nursing workforce expert, a

geriatric NP with research experience in older adult care, and an oncology NP. The authors required the dataset to include the ability to measure NPs and the type of care provided by them; the malignancy type, age, and insurance status of the individual aged 65 years or older with cancer; and any procedures performed during the course of cancer treatment or diagnosis. The authors reviewed all available administrative datasets that met the criteria.

Providers were identified with the National Provider Identifier (NPI), a unique 10-digit identifier required by the Health Insurance Portability and Accountability Act for use in all health information transmissions involving patient care (U.S. Department of Health and Human Services, 2004). Research studies on primary care provision have been conducted comparing NP and physician care using NPI numbers (Perloff, DesRoches, & Buerhaus, 2015) to assess productivity. Prior research in primary care has demonstrated that, when compared to physicians, NPs provide more care for women, poorer patients, individuals who live in rural areas (Everett, Schumacher, Wright, & Smith, 2009), and

slightly younger patients (DesRoches et al., 2013; Perloff et al., 2015). Traditionally, patients with fewer financial resources and those who live in rural areas have been underserved in oncology (Charlton, Schlichting, Chioreso, Ward, & Vikas, 2015).

Patient-level information was required to confirm age and insurance status, and Current Procedural Terminology codes were used to identify the presence of procedures within the datasets. Malignancies were identified with the International Classification of Diseases, Ninth Revision (Slee, 1978).

## Methods

A review of all available administrative datasets was conducted; four met the prespecified criteria, and the remaining datasets were excluded for one of the following reasons:

- It was not possible to identify NP providers or their specialty.
- There was a complete reliance on self-reported data, with no confirmatory process.
- It was not possible to identify the type of care provided (i.e., oncologic).

The four datasets evaluated were the Medical Expenditure Panel Survey (MEPS), Chronic Conditions Data Warehouse (CCW), National Sample Survey of NPs (NSSNP), and Surveillance, Epidemiology, and End Results (SEER) Program registry data linked with Medicare (SEER–Medicare) (see Table 1).

## Results

### Medical Expenditure Panel Survey

The Agency for Healthcare Research and Quality has sponsored the MEPS since it began in 1996 (Agency

for Healthcare Research and Quality, 2009). The MEPS is given to selected individuals who participated in the National Health Interview Survey the prior year (Cohen, Cohen, & Banthin, 2009). It is a survey administered through telephone calls to patients and their family members in waves during a two-year period. The most recent survey in 2016 included 14,000 households in six separate telephone interviews during a 14-month period. The MEPS collects data on the amount and the frequency of healthcare service use, how it is paid for, and any additional cost for the individual patient and family.

In addition to the individual patient data gathered, a separate, smaller provider survey, called the Medical Provider Component (MPC), is also administered. The purpose of the MPC survey is to collect data on hospitals and providers; the MPC was designed to confirm the self-reported data provided by participants. This pairing of individual-reported data with provider-confirmed data improves the reliability of the survey.

The MEPS' strengths were its ability to describe trends involving healthcare usage in the United States, identify how the care was paid for, and measure overall healthcare costs. The data were collected through patient self-report, with a percentage of participants' responses confirmed through provider report. Although this dataset offers an opportunity to provide confirmation on the number of NPs caring for a variety of health conditions, only a small number of providers was caring for patients with cancer. Further investigation into the number of NPs caring for patients with cancer within the most recent MEPS dataset identified a small number

**TABLE 1. Administrative Datasets Reviewed With Prespecified Criteria**

Dataset	Able to Identify NP Providers	Patients Aged 65		
		Years or Older Present in Data	Malignancies Identifiable	Procedures Identifiable
Chronic Conditions Data Warehouse	X	X	X	X
Medical Expenditure Panel Survey	X	X		X
National Sample Survey of NPs	X	X		
SEER–Medicare	X	X	X	X

NP—nurse practitioner; SEER—Surveillance, Epidemiology, and End Results Program

of NPs, which prohibited the use of this dataset to identify the NP care contribution to older adults with cancer.

### National Sample Survey of Nurse Practitioners

The Health Resources and Service Administration (HRSA) has conducted RN workforce surveys every four years since 1977, but the NSSNP was the first survey to focus exclusively on NPs. The National Center for Health Workforce Analysis, a division of HRSA, conducted the survey. The survey's intent was to gather information and identify gaps in NP education, distribution, and practice in the United States. HRSA acquired the lists of all active NPs through state licensing boards to obtain a representative sample of NPs in the United States. A random sample of the full population of NPs from each state was sent a survey. Data were collected for five months (from March 2012 through July 2012) in three waves, with reminder postcards being sent. The 13,000 NPs who completed the survey represent a 60% response rate. Some surveys were returned with incomplete data or were not returned; consequently, the researchers used sample weights with jackknife replication to achieve variance estimation (U.S. Department of Health and Human Services, Health Resources and Services Administration, 2014). Statistical methods, such as jackknife, are commonly used to eliminate bias and variability by resampling.

Although the NSSNP was comprehensive in its intent, the entire survey relies on self-reported information. The initial sample was drawn from the licensing boards of all 50 states, but there was no confirmation of any data provided by the respondents. The overall strength of the survey was the inclusion of all 50 states in the sampling strategy, but the complete reliance on self-reported data was a significant weakness, as was the inability to measure or analyze the NP contribution to oncology care. The survey did not make patient-level data available, because the providers were the only ones who were sampled.

### Chronic Conditions Data Warehouse

The CCW is a database created by the Centers for Medicare and Medicaid Services (CMS) to provide researchers with beneficiary linked data, including claims, diagnosis, and assessments. The CCW includes patient-level data and data on the providers. Provider-level data are linked through the NPI number. Unlike the previous datasets discussed, the

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### KNOWLEDGE TRANSLATION

- Workforce analyses of physicians and other healthcare providers are regularly conducted, but nursing researchers have not fully used these datasets to describe the nurse practitioner (NP) workforce.
  - Cancer-specific nursing researchers interested in secondary data analysis should consider the Chronic Conditions Data Warehouse and the Surveillance, Epidemiology, and End Results (SEER) Program–Medicare dataset; both contain provider- and patient-level information.
  - Despite limitations associated with Medicare claims, the SEER–Medicare dataset provides the best opportunity to analyze NP care for older adults with cancer.
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CCW dataset allows for a more detailed and robust analysis of quantity and cost of care confirmed with claims data. It is also frequently used to analyze care for older adults with multiple comorbid conditions. However, for the purposes of this review, the major weakness was the limited number of malignancies included—only breast, colorectal, endometrial, lung, and prostate. Unfortunately, these alone represent only half of the new cancer cases (American Cancer Society, 2014).

### SEER–Medicare Dataset

SEER–Medicare is the final dataset analyzed in this review. The SEER registry provides information on cancer incidence, prevalence, and mortality for the United States (Bradley, Penberthy, Devers, & Holden, 2010; National Cancer Institute, n.d.); these population-based cancer incidence statistics have been collected by SEER since 1973 (Siegel, Miller, & Jemal, 2015). The SEER dataset was linked to CMS claims for the first time in 1991 by matching individual identifiers from SEER to Medicare's master enrollment files and has been updated every three to four years; the most recently available SEER data are through 2013, linked with Medicare claims through 2014.

The SEER–Medicare dataset includes data on the patient and provider level, which is similar to the CCW; however, all malignancies are included in the SEER–Medicare dataset. A study by Perloff et al. (2015) of 558,199 Medicare beneficiaries that compared the cost of physician-provided care with NP-provided care identified 107,219 patients who received primary care from NPs. This large number suggests that NPs providing

primary care are represented in the data. However, it is not known whether a similarly large number of NPs provide cancer care.

Limitations are involved in using Medicare claims data to identify individual provider contribution to patient care. A phenomenon known as “incident to” billing may result in an underrepresentation of NP-provided care. Incident to billing is defined by CMS as services billed by nonphysician providers under the physician fee schedule instead of an NP or a PA fee schedule (services provided by NPs or PAs are reimbursed at 85% of the amount the physician is reimbursed). The difference in the reimbursement may incentivize institutions or individual practices to bill at the higher rate, regardless of which provider delivered the care. Because Medicare currently includes primarily fee-for-service insurance claims, it may underrepresent providers of patients who have managed care plans (Bindman, 2013). Despite the limitations, the SEER-Medicare dataset offers the most complete and accurate portrait of NP-provided cancer care to older adults.

### Implications for Nursing

NPs are positioned to play a critical role in addressing the looming oncology workforce shortage. By 2025, there will be a 40% increase in the need for cancer care, directly related to the growth of older adults. The physician cancer workforce cannot grow at a sufficient rate to accommodate this volume.

Physician specialists have been identified through secondary data analysis, but their use in estimating the nursing workforce has been limited. Secondary data analyses are instrumental in identifying the current care provided, specifically to a population that is projected to grow rapidly. These analyses can identify trends that can be used to set workforce priorities. The authors focused on NP cancer care for older adults, but the SEER-Medicare dataset provides a rich opportunity to focus on the care of older adults and may be used for other future research studies.

### Conclusion

The oncology community will be faced with an inadequate supply of oncologists when the largest group of individuals diagnosed with cancer doubles in size. Workforce analyses often use large administrative datasets to inform and predict demand and supply, but nursing research has only recently begun to use these resources. To provide adequate cancer care for older adults, claims data have been used to describe,

quantify, and analyze the quantity and cost of primary care delivered by NPs but, to date, not to measure NP specialty care.

Evidence demonstrates that NPs provide some amount of cancer care. The authors identified SEER-Medicare as the most appropriate dataset to measure NP-provided cancer care for the older adult population, with the hope that further research will be conducted to address the increased need for cancer care in the setting of an insufficient supply of oncologists—specifically, further research to better quantify the type of care provided and patient outcomes as a result of the care provided. Workforce research informs future training needs and influences policymakers’ decisions. Because this research is often referred to as evidence and rationale for funding choices, the presence or absence of these large datasets in nursing research will shape future legislation.

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Both authors contributed to the conceptualization and design, completed the data collection, provided statistical support and the analysis, and contributed to the manuscript preparation.

### REFERENCES

- Agency for Healthcare Research and Quality. (2009). Medical Expenditure Panel Survey: Survey background. Retrieved from [https://mepsahrq.gov/mepsweb/about\\_meps/survey\\_back.jsp](https://mepsahrq.gov/mepsweb/about_meps/survey_back.jsp)
- American Cancer Society. (2014). *Cancer facts and figures, 2014*. Retrieved from <https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2014/cancer-facts-and-figures-2014.pdf>
- American Society of Clinical Oncology. (2014). The state of cancer care in America, 2014: A report by the American Society of Clinical Oncology. *Journal of Oncology Practice*, 10, 119–142. <https://doi.org/10.1200/JOP.2014.001386>
- Bindman, A.B. (2013). Using the national provider identifier for health care workforce evaluation. *Medicare and Medicaid Research Review*, 3(3), pii: mmr.003.03.b03.
- Bradley, C.J., Penberthy, L., Devers, K.J., & Holden, D.J. (2010).



- Health services research and data linkages: Issues, methods, and directions for the future. *Health Services Research*, 45, 1468–1488. <https://doi.org/10.1111/j.1475-6773.2010.01142.x>
- Britell, J.C. (2010). Role of advanced nurse practitioners and physician assistants in Washington state. *Journal of Oncology Practice*, 6, 37–38. <https://doi.org/10.1200/JOP.091068>
- Buswell, L.A., Ponte, P.R., & Shulman, L.N. (2009). Provider practice models in ambulatory oncology practice: Analysis of productivity, revenue, and provider and patient satisfaction. *Journal of Oncology Practice*, 5, 188–192. <https://doi.org/10.1200/JOP.0942006>
- Charlton, M., Schlichting, J., Chioreso, C., Ward, M., & Vikas, P. (2015). Challenges of rural cancer care in the United States. *Oncology*, 29(9). Retrieved from <http://www.cancernetwork.com/oncology-journal/challenges-rural-cancer-care-united-states>
- Chavez, K.S., Dwyer, A.A., & Ramelet, A.S. (2018). International practice settings, interventions and outcomes of nurse practitioners in geriatric care: A scoping review. *International Journal of Nursing Studies*, 78, 61–75. <https://doi.org/10.1016/j.ijnurstu.2017.09.010>
- Cohen, J.W., Cohen, S.B., & Banthin, J.S. (2009). The Medical Expenditure Panel Survey: A national information resource to support healthcare cost research and inform policy and practice. *Medical Care*, 47(7 Suppl. 1), S44–S50. <https://doi.org/10.1097/MLR.0b013e3181a23e3a>
- DesRoches, C.M., Gaudet, J., Perloff, J., Donelan, K., Iezzoni, L.I., & Buerhaus, P. (2013). Using Medicare data to assess nurse practitioner-provided care. *Nursing Outlook*, 61, 400–407. <https://doi.org/10.1016/j.outlook.2013.05.005>
- Duszak, R., Jr., Walls, D.G., Wang, J.M., Hemingway, J., Hughes, D.R., Small, W.C., & Bowen, M.A. (2015). Expanding roles of nurse practitioners and physician assistants as providers of nonvascular invasive radiology procedures. *Journal of the American College of Radiology*, 12, 284–289. <https://doi.org/10.1016/j.jacr.2014.08.021>
- Everett, C.M., Schumacher, J.R., Wright, A., & Smith, M.A. (2009). Physician assistants and nurse practitioners as a usual source of care. *Journal of Rural Health*, 25, 407–414.
- Friese, C.R., Hawley, S.T., Griggs, J.J., Jagsi, R., Graff, J., Hamilton, A.S., . . . Katz, S.J. (2010). Employment of nurse practitioners and physician assistants in breast cancer care. *Journal of Oncology Practice*, 6, 312–316.
- Gilani, N., Patel, N., Gerkin, R.D., Ramirez, F.C., Tharalson, E.E., & Patel, K. (2009). The safety and feasibility of large volume paracentesis performed by an experienced nurse practitioner. *Annals of Hepatology*, 8, 359–363.
- Hinkel, J.M., Vandergrift, J.L., Perkel, S.J., Waldinger, M.B., Levy, W., & Stewart, F.M. (2010). Practice and productivity of physician assistants and nurse practitioners in outpatient oncology clinics at national comprehensive cancer network institutions. *Journal of Oncology Practice*, 6, 182–187.
- Hoffman, L.A., Tasota, F.J., Zullo, T.G., Scharfenberg, C., & Donahoe, M.P. (2005). Outcomes of care managed by an acute care nurse practitioner/attending physician team in a subacute medical intensive care unit. *American Journal of Critical Care*, 14, 121–130.
- Moote, M., Krsek, C., Kleinpell, R., & Todd, B. (2011). Physician assistant and nurse practitioner utilization in academic medical centers. *American Journal of Medical Quality*, 26, 452–460.
- Moote, M., Nelson, R., Veltkamp, R., & Campbell, D., Jr. (2012). Productivity assessment of physician assistants and nurse practitioners in oncology in an academic medical center. *Journal of Oncology Practice*, 8, 167–172.
- Murphy, F.B., Walls, G., Tridandapani, S., Ibraheem, O., Bowen, M., Bressler, S., . . . Small, W. (2014). Comparison of image-guided nonfocal hepatic biopsies performed by physicians and nurse midlevel providers. *Journal of the American College of Radiology*, 11, 1059–1063. <https://doi.org/10.1016/j.jacr.2014.03.021>
- National Cancer Institute. (n.d.). Surveillance, Epidemiology and End Results Program. Retrieved from <http://seer.cancer.gov>
- Ortman, J.M., Velkoff, V.A., & Hogan, H. (2014). *An aging nation: The older population in the United States*. Retrieved from <https://www.census.gov/prod/2014pubs/p25-1140.pdf>
- Perloff, J., DesRoches, C.M., & Buerhaus, P. (2015). Comparing the cost of care provided to Medicare beneficiaries assigned to primary care nurse practitioners and physicians. *Health Services Research*, 51, 1407–1423. <https://doi.org/10.1111/1475-6773.12425>
- Ruegg, T.A. (2013). A nurse practitioner-led urgent care center: Meeting the needs of the patient with cancer [Online exclusive]. *Clinical Journal of Oncology Nursing*, 17, E52–E57. <https://doi.org/10.1188/13.CJON.E52-E57>
- Siegel, R.L., Miller, K.D., & Jemal, A. (2015). Cancer statistics, 2015. *CA: A Cancer Journal for Clinicians*, 65, 5–29.
- Slee, V.N. (1978). The International Classification of Diseases: Ninth revision (ICD-9). *Annals of Internal Medicine*, 88, 424–426.
- U.S. Department of Health and Human Services. (2004). *HIPAA administrative simplification: Standard unique health identifier for health care providers*. Retrieved from <https://www.govinfo.gov/content/pkg/FR-2004-01-23/pdf/04-1149.pdf>
- U.S. Department of Health and Human Services, Health Resources and Services Administration. (2014). *Highlights from the 2012 national sample survey of nurse practitioners*. Retrieved from [https://bhwh.hrsa.gov/sites/default/files/bhw/nchwa/npsurvey\\_highlights.pdf](https://bhwh.hrsa.gov/sites/default/files/bhw/nchwa/npsurvey_highlights.pdf)
- Weir, H.K., Thompson, T.D., Soman, A., Moller, B., & Leadbetter, S. (2015). The past, present, and future of cancer incidence in the United States: 1975 through 2020. *Cancer*, 121, 1827–1837. <https://doi.org/10.1002/cncr.29258>
- Yang, W., Williams, J.H., Hogan, P.F., Bruinooge, S.S., Rodriguez, G.I., Kosty, M.P., . . . Goldstein, M. (2014). Projected supply of and demand for oncologists and radiation oncologists through 2025: An aging, better-insured population will result in shortage. *Journal of Oncology Practice*, 10, 39–45. <https://doi.org/10.1200/JOP.2013.001319>