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Variation in the Types of Providers Participating in Breast Cancer Follow-up Care: a SEER-Medicare Analysis

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Abstract

Background—Current guidelines do not delineate the provider types that should participate in breast cancer follow-up. The objectives were to: 1) describe the provider types participating in early follow-up of older breast cancer survivors; and 2) identify factors associated with receipt of follow-up from different provider types.

Methods—Stage I–III breast cancer survivors treated from 2000–2007 were identified in the SEER-Medicare database (n=44,306). Oncologist follow-up and primary care visits were defined using Medicare specialty provider codes and linked AMA Masterfile. The provider types involved in follow-up were summarized. Stepped regression models identified 1) factors associated with receipt of medical oncology follow-up, and 2) factors associated with receipt of medical oncology alone versus combination oncology follow-up.

Results—80% had oncology follow-up: 80% with a medical oncologist, 46% with a surgeon and 39% of patients treated with radiation followed with a radiation oncologist. Patients with larger tumor size, positive axillary nodes, ER positive status and chemotherapy treatment were more likely to have medical oncology follow-up, while patients who were older, with higher Charlson comorbidity scores, and not undergoing axillary evaluation were less likely. The only factor associated with increased likelihood of follow-up with a combination of oncology providers was having regular primary care visits (>2 visits/year)

Conclusions—Substantial variation in the provider types that participate in breast cancer follow-up exists. Improved guidance on the types of providers involved and delineation of what

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each provider's responsibilities during follow-up should be could lead to improved efficiency and quality of care

Keywords

breast cancer; follow-up; surveillance; survivorship; primary care

Introduction

There are almost 3 million breast cancer survivors currently living in the United States, all of whom require survivorship care.^{1–3} Current guidelines recommend frequent follow-up visits performed by a “physician experienced in the surveillance of patients with cancer and in breast examination”¹ or “members of the treatment team”.² We, and others, have demonstrated that significant variation exists in how frequently patients receive follow-up visits during early survivorship.^{4–6} In our study, this variation was strongly related to the intensity of treatment received (with women receiving radiation and/or chemotherapy more likely to have more frequent follow-up even after controlling for patient's sociodemographic variables, tumor stage, and estrogen/progesterone receptor status). However, follow-up frequency was also associated with the number and types of oncologists involved in follow-up,⁶ which in turn was associated with the receipt of more “disordered” and potentially redundant care.⁷ As current guidelines allow individual providers significant latitude in deciding whether or not to participate in ongoing follow-up for a given breast cancer survivor, these findings suggest that challenges associated with coordinating care amongst multiple providers may contribute to increased frequency of follow-up visits.

Improving the efficiency of surveillance breast cancer care is an important component of improving overall quality of survivorship care.⁸ Understanding patterns of care, as well as factors associated with different provider's participation in follow-up, can help to define the level of redundancy that currently occurs and identify opportunities to streamline care and optimize resource utilization. This streamlining is particularly critical given the high cost of providing cancer care,⁹ and the expected increased demand for survivorship care (35% increase by 2022) combined with a projected shortage of oncologists.¹⁰ The objectives were to 1) describe the types and combinations of providers participating in the care of older breast cancer survivors within the first three years after a diagnosis; and 2) identify factors associated with receipt of follow-up from these different types of providers.

Methods

This study was granted a waiver of consent by the University of Wisconsin Institutional Review Board.

Patient selection

Using the linked Surveillance, Epidemiology and End Results (SEER)-Medicare database, we identified all female, Medicare-enrolled patients aged 66 years and older diagnosed with stage I–III invasive breast cancer between 2000 and 2007. Patients were included in the study if they underwent definitive breast surgery.⁶ Continuous enrollment in Medicare Part

A and B was required for 1-year preceding diagnosis to allow ascertainment of comorbidities through a minimum of 2-years after diagnosis, death, or December 31, 2009 (whichever came first) to assess follow-up received. Patients were excluded if they were enrolled in a Health Maintenance Organization (HMO) during the same time period. Patients were also excluded if they were diagnosed with another malignancy five years before or after the date of the breast cancer diagnosis.

Primary outcome variable

The primary outcome variable was the type of oncology provider involved in follow-up. To ensure only follow-up (rather than active treatment) visits were captured, we defined the evaluable surveillance window as beginning 12 months after diagnosis or a minimum of 3 months after last treatment (excluding endocrine therapy and reconstructive surgery).¹¹ We required patients to have a minimum of 1 year of surveillance. Our evaluable surveillance window ended at the earliest of these events: 1) 4 years after diagnosis; 2) death; 3) 12/31/2009 (end of available data); or 4) 3 months prior to a new ICD-9 diagnosis code for secondary cancer [excluding breast and unspecified site], a 2nd SEER breast cancer diagnosis, or resumption of treatment after a 90-day gap.^{12–14} Our surveillance window ended 3 months prior to these events to minimize bias associated with inappropriately capturing clinic visits for work-up of recurrence or ongoing treatment.

All clinic visits with an appropriate Evaluation and Management code were assessed. Any visit with a surgical, medical, or radiation oncologist was considered to be an “oncologist visit”. For the purposes of this study, we considered any general surgeon who performs breast cancer care (i.e. mastectomy or breast conserving surgery) to be a surgical oncologist. We defined oncologist visits using the Medicare specialty provider code and linked AMA Masterfile.^{15,16} In cases where both the AMA Masterfile and Medicare specialty provider code were missing or did not indicate an oncology specialty, we evaluated physicians’ claims to determine whether their clinical practice was consistent with being an oncologist based on specified algorithms of case mix;¹⁵ a breast cancer ICD-9 diagnosis code was required for any oncologist visits identified by these claims-based definitions.¹⁵ Primary care physician (PCP) visits were defined using a similar strategy.

Patient-related variables

Basic demographics, including date of birth, gender, race/ethnicity, and marital status, were obtained from the SEER PEDSF file. Socioeconomic status was assessed using census tract median level of household income and median level of education. Residence location was assessed using the Rural Urban Commuting Area codes. The Deyo implementation¹⁷ of the Charlson Comorbidity Index¹⁸ was used to assess patient comorbidities. The 6th edition American Joint Committee on Cancer (AJCC) staging¹⁹ was used to assign stage based on tumor size and number of nodes positive. Estrogen receptor (ER), progesterone receptor (PR), and tumor grade were also assessed using SEER. Definitions for treatment (type of surgery, chemotherapy, radiation) are included in the appendix. Endocrine therapy was not able to be assessed, as oral medications are not included in Medicare part A and B.

Analysis

Summary statistics were used to describe patient demographic and disease characteristics for the entire cohort. We describe the proportion of patients who received follow-up from an oncologist. To be considered as having follow-up by an oncology provider type, at least two visits with that specialty during the surveillance period were required. We used univariate statistics (Chi-square) to identify factors associated with receipt of follow-up by an oncologist versus no follow-up with an oncologist.

For patients with oncologist follow-up, we then summarized the types of oncology providers participating in follow-up during the surveillance period. The vast majority of breast cancer survivors meet with medical and surgical oncology during their treatment course. However, whether radiation oncology participates varies based on the type of local-regional treatment received. To account for this, we conducted our analysis on 4 cohorts: 1) women treated with breast conserving surgery (BCS) alone (n=2,357), 2) women treated with BCS with radiation (XRT) (n=19,192), 3) women treated with mastectomy alone (n=11,120), and 4) women treated with mastectomy with XRT (n=2,543). Findings for the BCS+XRT and the mastectomy alone cohort are presented in the body of the manuscript; in general, similar trends were observed for patients in the other two cohorts. We created stepped logistic regression models: 1) to identify factors associated with receipt of medical oncology follow-up versus no medical oncology, and 2) to identify factors associated with medical oncology alone versus medical oncology in combination with radiation and/or surgical oncology accounting for patient demographic and disease characteristics.

Results

Patient demographic, tumor and treatment characteristics for the overall cohort (n=44,306) are presented in Table 1. Eighty percent of patients (n=35,212) had follow-up with an oncologist. Characteristics of women with and without oncology follow-up differed significantly (Table 1), with 63% of women without oncology follow-up either over the age of 80, having a Charlson comorbidity score of 2 or more, not undergoing axillary staging, and/or having an unknown ER status. Eighty-eight percent of patients without oncology follow-up were seen by a PCP at least once during the follow-up period.

Provision of follow-up by oncology providers

When considering the cohort of patients who had follow-up with an oncology provider, the types of providers participating in follow-up varied by the type of primary local-regional treatment received (Figure 1). The majority of patients (66–90%) received at least some follow-up from a medical oncologist, either alone or in combination with providers from other oncology specialties. Forty-six percent of patients received follow-up from a surgeon, and 39% of patients treated with radiation received follow-up from a radiation oncologist. Of patients treated with radiation, 12% received follow-up from all three specialties.

Factors associated with oncology provider follow-up

Table 2 describes the factors associated with medical oncology follow-up (alone or in combination or other oncology providers) compared with follow-up by a radiation

oncologist and/or surgeon. Larger primary tumor size, positive axillary nodes, ER positive status (likely as a surrogate for receipt of adjuvant endocrine therapy), and chemotherapy treatment were all associated with having at least some follow-up by a medical oncologist. Conversely, older patients, those with higher Charlson comorbidity scores, and those not undergoing axillary staging evaluation were less likely to have any follow-up with medical oncology (i.e. were instead followed by a radiation oncologist and/or surgeon). In addition to these clinical characteristics, having clinic appointments with a PCP during the surveillance period was associated with a higher likelihood of receiving follow-up from a medical oncologist.

A number of patient, tumor and treatment characteristics were associated with a decreased likelihood of having combination follow-up with multiple types of oncologists (Table 3). The factor most consistently associated with a higher likelihood of receiving combination follow-up with medical oncology and other oncologists (radiation oncology and/or surgery) was the number of PCP visits per year, with a higher number of PCP visits associated with a greater likelihood of receiving combination oncology follow-up.

Discussion

In this population based cohort of older breast cancer survivors, we determined that substantial variation exists regarding the types of providers that participate in survivorship care. Although the vast majority (80%) of patients received follow-up from an oncology provider, most patients also had regular visits with a PCP (93%). The number of providers involved and the complexity of coordinating care amongst multiple providers creates the potential for significant redundancy and highlights an opportunity to improve the efficiency as well as the quality of breast cancer follow-up.⁸

In our cohort, primary care was uncommonly the sole provider of follow-up. This finding is consistent with prior studies that suggest oncologists are reluctant to completely defer follow-up to primary care in the first few years after a diagnosis.^{20–24} However, the recognized importance of primary care involvement in the care of older breast cancer survivors for overall wellness is also reflected in our findings, as the overwhelming majority of patients had regular primary care visits. This data highlights the need for a strong working relationship and good communication between oncologists and the PCPs they share patients with.

We observed that medical oncologists play a prominent role in follow-up for older breast cancer patients. Medical oncologists were more likely to follow patients who would be eligible for systemic therapy, i.e. patients with larger primary tumors, positive axillary nodes, or ER positive status. Conversely, patients who may be perceived as poor candidates for systemic therapy, due to age or comorbidities, were more likely to instead receive follow-up by a surgeon and/or a radiation oncologist. Overall, these observations are very consistent with the limited literature discussing reasons why different types of providers participate in breast cancer follow-up.^{25,26} In our prior work, we determined that medical oncologists participated in follow-up largely due to a sense of responsibility for ongoing therapy (i.e.

endocrine therapy) and a perceived strong patient-doctor relationship that developed over the course of chemotherapy.²⁶

Although most patients received at least some follow-up from a medical oncologist, 60% additionally received follow-up from a surgeon or a radiation oncologist. The only factor consistently associated with receipt of combination follow-up from multiple types of oncology providers was the number of PCP visits per year, with an increasing number of PCP visits associated with a higher likelihood of also seeing a combination of oncology providers. Our data does not allow us to determine the etiology of this relationship. We hypothesize that this may reflect patients' ease of access to health care and/or propensity for health care utilization.^{27,28} However, it may also reflect uncertainty on the part of both oncologists and PCPs regarding their specific roles in follow-up. This observation is worthy of further investigation as these results have important implications for coordinating care between specialists and PCPs.

Very limited data exists in the literature examining why surgeons or radiation oncologists participate in breast cancer follow-up. In a longitudinal study of breast cancer patients in Los Angeles and Detroit, only race was associated with surgeon follow-up, with black women more likely to report having follow-up from a surgeon than a medical oncologist.²⁵ In our qualitative work, surgeons and radiation oncologists described a selective approach to their participation in breast cancer follow-up.²⁶ This finding was largely driven by what they perceived to be their specific skillset during follow-up: a potentially higher quality physical exam to assess for local-regional recurrence. Surgeons and radiation oncologists were more likely to follow patients who they felt may benefit most from such a focused exam, such as women with fat necrosis after radiation or women with a complicated post-mastectomy exam. Importantly, radiation oncologists and surgeons also reported making their decisions whether or not to participate in follow-up after determining what other providers are participating in follow-up in an effort to minimize redundancy. Both of these cited reasons for surgeon and radiation oncologist follow-up are very subjective and specific to the decision making of the individual provider. This likely contributes to the substantial variation in follow-up observed in the current study.

Our study has the usual limitations associated with SEER-Medicare data, namely that the findings cannot be generalized to a younger population. However, we hypothesize that the observed variation would be further exacerbated in younger patients, as these patients are more likely to receive chemotherapy^{29,30} and may be more likely to be selected by radiation oncologists and surgeons for follow-up.²⁶ Our years of diagnosis included in the study were from 2000–2007, to allow for an adequate surveillance period to determine trends in practice. It is possible that trends in care, especially with regards to the role PCPs play, will have shifted. Further, although we can report the number of PCP visits per year, we cannot report the reasons for that visit (i.e. breast cancer follow-up versus another reasons). Consequently, our report may underestimate the amount of follow-up care (and potential redundancy in follow-up care) received by breast cancer survivors, as we cannot know whether breast cancer survivorship issues were addressed within the context of the PCP visits.

Conclusion

In this study of older breast cancer survivors, we determined that there is substantial variation in the type of providers participating in breast cancer follow-up. Follow-up is provided most commonly by a medical oncologist, and is driven by factors that would predict perceived appropriateness for receipt of systemic therapy. However, 94% are also being seen by a PCP and 60% receive follow-up by other oncologists. No clear clinical predictors for participation by other oncologists were identified. This finding, combined with our prior qualitative work,²⁶ suggests that improved guidance on what types of providers should participate in follow-up and delineation of what each providers' responsibilities should be during follow-up could help to decrease the observed variation in current clinical practice and redundancy in the system. Incorporation of such guidance into future clinical practice guidelines has the potential to improve both the quality and efficiency of breast cancer follow-up.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Synopsis

Substantial variation in the types of providers participating in breast cancer follow-up exists. Improved guidance on the types of providers involved and delineation of what each provider's responsibilities should be during follow-up could lead to improved efficiency and care quality.

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Figure 1.
Types of Oncology Providers Participating in the Follow-up Care of Older Breast Cancer Survivors

Table 1

Demographic and Clinical Characteristics of Overall Cohort, and by Follow-up with an Oncologist

	Overall Cohort	Follow-up with an Oncologist	No Follow-up with an Oncologist	
	N=44,306	N=35,212	N=9,094	
Age				
66–70	25% (11,137)	28% (9,858)	14% (1,279)	P<0.0005
71–75	25% (11,244)	27% (9,555)	19% (1,689)	
76–80	25% (10,894)	25% (8,701)	24% (2,193)	
>80	25% (11,031)	20% (7,098)	43% (3,933)	
Race				
White	90% (39,708)	90% (31,639)	89% (8,069)	P<0.0005
Black	5% (2,423)	5% (1,825)	6% (598)	
Other	5% (2,175)	5% (1,748)	5% (427)	
Marital status				
Married	45% (19,857)	48% (16,881)	33% (2,976)	P<0.0005
Widowed	38% (16,823)	35% (12,409)	59% (4,414)	
Single	14% (6,252)	14% (4,879)	15% (1,373)	
Unknown	3% (1,374)	3% (1,043)	4% (331)	
Rural	9% (3,944)	8% (2,930)	11% (1,014)	P<0.0005
Charlson Comorbidity Score				
0	65% (28,795)	67% (23,443)	59% (5,352)	P<0.0005
1	23% (10,072)	22% (7,901)	24% (2,171)	
2 or more	12% (5,242)	11% (3,729)	17% (1,513)	
Tumor Size				
2 cm	73% (32,290)	74% (25,902)	70% (6,388)	P<0.0005
2–5 cm	24% (10,667)	23% (8,279)	26% (2,388)	
>5 cm	3% (1,349)	3% (1,031)	4% (318)	
Node				
Negative	68% (30,216)	69% (24,396)	64% (5,820)	P<0.0005
Positive	20% (8,881)	22% (7,622)	14% (1,259)	
No path evaluation	12% (5,209)	9% (3,194)	22% (2,015)	
ER/PR				
Positive	64% (28,175)	65% (22,732)	60% (5,442)	P<0.0005
Negative	24% (10,849)	24% (8,594)	25% (2,225)	
Unknown	12% (5,282)	11% (3,886)	15% (1,396)	
Local-Regional Therapy				
BCS without XRT	10% (4,405)	7% (2,357)	22% (2,048)	P<0.0005

	Overall Cohort	Follow-up with an Oncologist	No Follow-up with an Oncologist	
	N=44,306	N=35,212	N=9,094	
Mastectomy without XRT	34% (15,041)	32% (11,120)	43% (2,921)	
Lumpectomy with XRT	50% (22,005)	54% (19,192)	31% (2,812)	
Mastectomy with XRT	6% (2,855)	7% (2,543)	3% (312)	
Receipt of chemotherapy	17% (7,396)	19% (6,822)	6% (574)	P<0.0005
Average PCP visits per year				
0	8% (3,631)	7% (2,533)	12% (1,098)	
1–2 visits	25% (11,265)	24% (8,615)	29% (2,650)	P<0.0005
2–4 visits	28% (12,439)	29% (10,122)	25% (2,317)	
>4 visits	38% (16,971)	40% (13,942)	33% (3,029)	

Table 2

Demographic and Clinical Characteristics Associated with Receipt of Follow-up Care from a Medical Oncologist (Alone or in Combination with Other Oncology Providers) versus Follow-up by a Radiation Oncologist and/or Surgeon Only

	Mastectomy with radiation		Breast conserving surgery with radiation	
	N=11,120	OR with 95% Confidence Interval	N=19,192	OR with 95% Confidence Interval
Age				
66–70	25%	Reference	31%	Reference
71–75	26%	0.9 (0.7–1.0)	29%	0.8 (0.7–0.9)
76–80	26%	0.7 (0.6–0.8)	24%	0.7 (0.6–0.7)
>80	23%	0.5 (0.4–0.6)	15%	0.5 (0.4–0.5)
Race				
White	88%	Reference	91%	Reference
Black	6%	1.0 (0.8–1.2)	4%	0.8 (0.7–0.9)
Other	6%	1.0 (0.8–1.3)	5%	1.2 (1.0–1.5)
Marital status				
Married	42%	Reference	52%	Reference
Widowed	42%	0.9 (0.8–1.0)	31%	0.8 (0.9–1.0)
Single	14%	0.8 (0.7–0.9)	14%	0.9 (0.8–1.0)
Unknown	3%	0.9 (0.7–1.2)	3%	1.0 (0.8–1.2)
Residency				
Rural	13%	Reference	6%	Reference
Urban	87%	1.1 (1.0–1.3)	94%	1.2 (1.0–1.4)
Charlson Comorbidity Score				
0	64%	Reference	69%	Reference
1	23%	1.0 (0.9–1.1)	22%	1.0 (0.9–1.1)
2 or more	13%	0.8 (0.7–0.9)	9%	0.8 (0.7–0.9)
Tumor Size				
2 cm	64%	Reference	83%	Reference
>2 cm	36%	1.2 (1.0–1.3)	17%	1.2 (1.1–1.3)
Node				
Negative	70%	Reference	76%	Reference
Node positive	25%	1.7 (1.5–2.0)	16%	1.9 (1.7–2.1)
No path evaluation	5%	0.8 (0.6–0.9)	8%	0.9 (0.8–1.0)
ER/PR				
Positive	60%	1.4 (1.2–1.5)	68%	1.3 (1.2–1.4)
Negative	26%	Reference	23%	Reference
Unknown	14%	1.0 (0.9–1.2)	9%	1.0 (0.9–1.1)

	Mastectomy with radiation		Breast conserving surgery with radiation	
	N=11,120	OR with 95% Confidence Interval	N=19,192	OR with 95% Confidence Interval
Receipt of chemotherapy	21%	3.8 (3.2–4.5)	16%	2.7 (2.4–3.0)
Average PCP visits per year				
0	8%	Reference	5%	Reference
1–2 visits	23%	1.2 (1–1.4)	24%	1.2 (1–1.4)
2–4 visits	27%	1.3 (1.1–1.5)	30%	1.4 (1.2–1.6)
>4 visits	42%	1.4 (1.2–1.6)	41%	1.4 (1.2–1.6)

OR >1 reflects a greater likelihood to receive follow-up from medical oncology alone

* Bolded ORs have a p value <0.05. Model controls for income, education, tumor grade.

ER, Estrogen Receptor; PR, Progesterone receptor; PCP, primary care provider

Table 3

Demographic and Clinical Characteristics Associated with Receipt of Follow-up Care by a Medical Oncologist in Combination with Other Oncology Providers versus Medical Oncologist Alone

	Mastectomy without radiation (n=9,345)	Breast conserving surgery with radiation (N=15,054)
	OR with 95% Confidence Interval	OR with 95% Confidence Interval
Age		
66–70	Reference	Reference
71–75	0.9 (0.8–1.0)	0.9 (0.9–1.0)
76–80	0.8 (0.7–0.9)	0.9 (0.8–0.9) *
>80	0.6 (0.5–0.6)	0.8 (0.7–0.8) *
Race		
White	Reference	Reference
Black	1.1 (0.9–1.4)	0.9 (0.7–1.0)
Other	0.7 (0.6–0.9)	0.9 (0.7–1.0)
Marital status		
Married	Reference	Reference
Widowed	0.9 (0.8–1.0)	0.9 (0.9–1.0)
Single	0.9 (0.8–1.0)	0.9 (0.8–1.0) *
Unknown	0.9 (0.7–1.2)	0.9 (0.7–1.2)
Residency		
Rural	Reference	Reference
Urban	1.1 (0.9–1.3)	1.4 (1.2–1.7) *
Charlson Comorbidity Score		
0	Reference	Reference
1	0.8 (0.7–0.9)	0.9 (0.9–1.0)
2 or more	0.7 (0.6–0.9)	0.9 (0.8–1.0)
Tumor Size		
2 cm	Reference	Reference
<2 cm	0.9 (0.8–1.0)	1.0 (0.9–1.1)
Node		
Negative	Reference	Reference
Node positive	1.1 (0.9–1.2)	1.0 (0.9–1.1)
No path evaluation	0.8 (0.6–1.0)	0.8 (0.7–0.9)
ER/PR		
Positive	1.0 (0.9–1.1)	0.9 (0.9–1.0)
Negative	Reference	Reference
Unknown	0.9 (0.8–1.0)	1.0 (0.9–1.2)

	Mastectomy without radiation (n=9,345)	Breast conserving surgery with radiation (N=15,054)
	OR with 95% Confidence Interval	OR with 95% Confidence Interval
Receipt of chemotherapy	0.9 (0.8–1.0)	1.0 (0.9–1.1)
Average PCP visits per year		
0	Reference	Reference
1–2 visits	1.1 (0.9–1.4)	1.2 (1.0–1.4)
2–4 visits	1.4 (1.1–1.7)	1.4 (1.2–1.7)
>4 visits	1.5 (1.2–1.8)	1.6 (1.4–1.9)

OR >1 reflects a greater likelihood to receive combination oncology follow-up

*
Bolded ORs have a p value <0.05. Model controls for income, education, tumor grade.

ER, Estrogen Receptor; PR, Progesterone receptor; PCP, primary care provider