Outcomes of Patients With Cancer Discharged to a Skilled Nursing Facility After Acute Care Hospitalization

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ABSTRACT

Background: After discharge from an acute care hospitalization, patients with cancer may choose to pursue rehabilitative care in a skilled nursing facility (SNF). The objective of this study was to examine receipt of anticancer therapy, death, readmission, and hospice use among patients with cancer who discharge to an SNF compared with those who are functionally able to discharge to home or home with home healthcare in the 6 months after an acute care hospitalization. **Methods:** A population-based cohort study was conducted using the SEER-Medicare database of patients with stage II–IV colorectal, pancreatic, bladder, or lung cancer who had an acute care hospitalization between 2010 and 2013. A total of 58,770 cases were identified and patient groups of interest were compared descriptively using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Logistic regression was used to compare patient groups, adjusting for covariates. **Results:** Of patients discharged to an SNF, 21%, 17%, and 2% went on to receive chemotherapy, radiotherapy, and targeted chemotherapy, respectively, compared with 54%, 28%, and 6%, respectively, among patients discharged home. Fifty-six percent of patients discharged to an SNF died within 6 months of their hospitalization compared with 36% discharged home. Thirty-day readmission rates were 29% and 28% for patients discharged to an SNF and home, respectively, and 12% of patients in hospice received <3 days of hospice care before death regardless of their discharge location. **Conclusions:** Patients with cancer who discharge to an SNF are significantly less likely to receive subsequent oncologic treatment of any kind and have higher mortality compared with patients who discharge to home after an acute care hospitalization. Further research is needed to understand and address patient goals of care before discharge to an SNF.

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Background

Studies have shown a significant correlation between functional status and survival for patients with cancer.^{1–3} The functional decline associated with progressive cancer is prognostic for health events that severely limit mobility and also with acute care hospitalizations.⁴ After discharge from an acute care hospitalization, patients may choose to pursue rehabilitative care in a skilled nursing facility (SNF). SNF care is considered a transitional period during which patients who are too weak to discharge home can receive skilled nursing care and rehabilitative therapies. Patients who discharge to an SNF are typically older, more medically complex, and have higher hospital readmission rates than those who are strong enough to discharge home.^{5–7}

Use of institutional postacute care increased from 21% in 2000 to 26% in 2015, resulting in Medicare spending >\$59 billion for these services in 2015.^{8,9} SNF services are covered by Medicare Part A (hospital insurance), which provides payments to SNFs for a set period of time to care for patients after a qualifying hospital stay. Importantly, the SNF is the only setting that Medicare reimburses for 24-hour care after an acute care hospitalization for patients who are not eligible for long-term acute care or inpatient rehabilitation.

There are 2 important limitations for patients with cancer who discharge to an SNF. First, patients with cancer rarely receive chemotherapy while admitted to an SNF because infusion chemotherapy is considered an outpatient procedure and covered by Medicare Part B whereas care in SNFs is covered by Part A. Therefore, to provide chemotherapy, SNFs would need to absorb the cost of administration and treatment. Second, availability of palliative care consultation remains limited for patients in SNFs.¹⁰

We sought to understand clinical outcomes of patients with stage II–IV pancreatic, colorectal, lung, and bladder cancers who discharge to an SNF compared with

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patients who discharge to home or home with home healthcare. These cancer types were selected because we anticipated that these patients would have high rates of hospital admission and readmission and would likely be candidates for SNF discharge, thus providing a robust cohort of patients for analysis. We assessed healthcare utilization by examining rates of receipt of cancer-directed therapy, 30-day readmission, death, and hospice use 6 months after an acute care hospitalization. We hypothesized that most patients who are discharged to an SNF do not subsequently receive oncologic treatment, have higher mortality and readmission rates, and have lower hospice use compared with patients who discharge to home or home with home healthcare.

Methods

Data Source

The data source was the SEER-Medicare database. The SEER program collects data from select cancer registries covering approximately 28% of the US population; 93% of persons aged ≥ 65 years in the SEER files are matched to the Medicare enrollment file. During our study, 72% to 76% of the Medicare population enrolled in Medicare Fee-for-Service (FFS). For cases enrolled in Medicare FFS, the combined file provides detailed demographic and clinical information collected by cancer registries at diagnosis plus covered healthcare services received before diagnosis, during initial treatment, and over the course of follow-up for the duration of available claims. The database also includes a limited set of census tract and zip code-level socioeconomic variables.¹¹

Sample Selection

We selected patients with colorectal, pancreatic, bladder, or lung cancer diagnosed between 2010 and 2013. We excluded records from patients with a subsequent primary tumor or other prior cancer diagnoses besides stage 0 or I breast or cervical cancer, or nonmetastatic prostate cancer diagnosed in the 3 years before the tumor of interest (total sample size: $n=301,776$, including 5,242 patients with one of the accepted prior tumors specified). Our analysis only included de novo cancers because information about recurrent cancers is not provided in the SEER-Medicare database. We further restricted to patients with AJCC 7th edition stage group II–IV tumors at diagnosis to obtain the patient sample with regional or advanced disease ($n=190,692$).^{12,13}

We identified the patient sample for which we had complete claims data by restricting it to patients aged ≥ 66 years at diagnosis ($n=150,679$) and excluding those diagnosed at autopsy and those with a missing diagnosis date ($n=127$) or with negative survival time

($n=359$). We included only patients who were continuously enrolled in Medicare FFS Parts A and B from 12 months before diagnosis through death or the end of the study follow-up, December 2014 ($n=91,568$).

The study sample was further limited to patients with a paid claim for a short-term inpatient stay subsequent to diagnosis that did not end in death or discharge to hospice ($n=64,160$). We assigned the first stay occurring in the month of diagnosis or later as the index inpatient stay. We required that the index stay occur by June 2014, with continuous enrollment in Medicare FFS Parts A and B for at least 6 months after discharge or until death if before 6 months, to ensure adequate follow-up for all outcome measures ($n=63,697$). Furthermore, removing discharge locations other than the 3 settings of interest (eg, inpatient residential facility, Medicare-certified long-term care hospital, transfer to another hospital) brought the total sample to 58,770 patients. Of these, 29% ($n=16,936$) had a prior oncologic visit (established) and 71% ($n=41,834$) had no prior oncologic visit (unestablished) (Figure 1). The Colorado Multiple Institutional Review Board and Duke Institutional Review Board approved this study.

Comparator Groups

Analyses were conducted among 3 comparison groups with discharge locations of interest: SNF, home, and home with home healthcare ($n=58,770$). We defined a confirmed discharge to an SNF as the presence of an SNF claim with an admission date equal to the index discharge date. Discharges to home and to home with home healthcare were identified using the patient discharge status code reported on the inpatient claim.

Outcomes

The primary outcome was receipt of anticancer therapy after an inpatient hospitalization in the 6 months after discharge. CPT codes, the Healthcare Common Procedure Coding System (HCPCS) codes, ICD-9 procedure and diagnosis codes, and National Drug Codes (NDCs) were used to identify treatment received, including radiotherapy (RT), chemotherapy, and targeted therapy (see supplemental eAppendix 1, available with this article at JNCCN.org). We included targeted therapy drugs approved by the FDA for the tumor sites of interest that had specific HCPCS codes initiated before December 2014. The selected drugs included bevacizumab, cetuximab, everolimus, panitumumab, ramucirumab, and ziv-aflibercept. Claims in the 6 months after discharge were used to obtain additional outcome measures: 30-day readmission, hospice use, and death. Hospice use was measured using the number of covered days of care reported on hospice claims in the 6 months after index discharge.

Figure 1. SEER-Medicare analysis sample derivation. Abbreviations: FFS, fee-for-service; SNF, skilled nursing facility.

Control Variables

We used SEER variables to obtain patient demographics and tumor characteristics at diagnosis, and used claims to identify characteristics of the index inpatient stay, prior health conditions, and healthcare services received, and to generate the Charlson comorbidity index and identify specific conditions of interest using Centers for Medicare and Medicaid Services' Chronic Conditions Data Warehouse algorithms. We also used treatment and other healthcare services received after diagnosis and before index admission, including visits with an oncology specialist, prior RT, chemotherapy, and targeted therapy, as covariates in the analysis.¹⁴

Statistical Analysis

The 3 patient groups of interest were compared descriptively using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. SEER-Medicare provides only the month of the cancer diagnosis but does not include date or setting in which the diagnosis was made. Patients with and without prior oncologist visits were considered separately in subsequent analyses to identify those patients with a known cancer diagnosis before index hospitalization versus those diagnosed with a new cancer at the time of index hospitalization. Subsequent cancer-directed treatment, mortality, readmission, and hospice use were compared by discharge setting using χ^2 tests. Logistic regression was used to compare patient groups, adjusting for covariates. Kaplan-Meier estimates were used to compare survival curves by patient group. For patients discharged to SNF, statistically significant predictors for the outcomes were identified using logistic regression and Cox proportional hazards regression. The regression models were developed using a random 50% subsample and validated on the remaining 50% subsample. Statistical significance was defined as $P < .05$.

Results

Patient Characteristics

The study population consisted of 58,770 people with stage II-IV colorectal (31%), lung (51%, with 77% non-small cell lung cancer), pancreatic (12%), or bladder cancer (6%) (Table 1). A total of 71% of patients were given a new cancer diagnosis at the time of index hospitalization (unestablished patients), whereas 29% had a known cancer diagnosis before index hospitalization (established patients). Mean (SD) length of stay (LOS) for the index hospitalization was 6.9 (± 5.8) days for all patients. LOS was 5.0 (± 3.8) days for patients discharging to home, 8.1 (± 5.8) days for those discharging to home with home healthcare, and 10.6 (± 7.6) days for those discharging to an SNF.

Table 1. Patient and Index Hospitalization Characteristics by Discharge Setting

Characteristic	All n (%)	Home n (%)	Home Healthcare n (%)	SNF n (%)
Patients	58,770 (100)	33,057 (56)	13,592 (23)	12,121 (21)
Male (vs female)	29,747 (50.6)	17,770 (53.4)	6,716 (49.4)	5,261 (43.4)
Median age (SD), y				
Index admission	77.6 (± 7.1)	76.2 (± 6.6)	77.9 (± 7.0)	81.0 (± 7.2)
Months between diagnosis and index admission	2.5 (± 3.8)	2.6 (± 3.9)	2.6 (± 3.7)	2.4 (± 3.7)
Race				
White non-Hispanic	47,668 (81.2)	26,733 (81.0)	10,826 (79.7)	10,109 (83.4)
Black non-Hispanic	4,974 (8.5)	2,697 (8.2)	1,331 (9.8)	946 (7.8)
Hispanic	3,070 (5.2)	1,791 (5.4)	746 (5.5)	533 (4.4)
Asian or Pacific Islander/American Indian/Alaska Native non-Hispanic	3,002 (5.1)	1,803 (5.5)	678 (5.0)	521 (4.3)
Married or partnered (vs nonmarried)	29,366 (50.0)	18,547 (56.1)	6,726 (49.5)	4,093 (33.8)
Census tract SES				
Median income, \$USD (SD)	61,513.9 ($\pm 25,634.1$)	60,509.0 ($\pm 25,300.2$)	62,071.9 ($\pm 26,359.9$)	63,635.6 ($\pm 25,566.1$)
% of residents below poverty level (SD)	14.0 (± 9.3)	14.3 (± 9.3)	14.1 (± 9.3)	13.2 (± 9.1)
% of non-high school graduates (SD)	14.4 (± 9.8)	14.6 (± 9.9)	14.6 (± 10.1)	13.7 (± 9.5)
Charlson comorbidity score				
0	19,452 (33.1)	11,848 (35.8)	4,210 (30.1)	3,394 (28.0)
1	16,946 (28.8)	9,879 (29.9)	3,933 (28.9)	3,134 (25.9)
2	9,845 (16.8)	5,288 (16.0)	2,333 (17.2)	2,224 (18.4)
≥ 3	12,527 (21.3)	6,042 (18.3)	3,116 (22.9)	3,369 (27.8)
Year of diagnosis				
2010	15,334 (26.1)	8,601 (26.0)	3,574 (26.3)	3,159 (26.1)
2011	14,812 (25.2)	8,431 (25.5)	3,358 (24.7)	3,023 (24.9)
2012	14,714 (25.0)	8,270 (25.0)	3,372 (24.8)	3,072 (25.3)
2013	13,910 (23.7)	7,755 (23.5)	3,288 (24.2)	2,867 (23.7)
Cancer type/stage				
Colorectal	18,472 (31.4)	9,666 (29.2)	4,239 (31.2)	4,567 (37.7)
Stage II	7,498 (40.6)	3,941 (40.8)	1,675 (39.5)	1,882 (41.2)
Stage III	6,528 (35.3)	3,545 (36.7)	1,474 (34.8)	1,509 (33.0)
Stage IV	4,446 (24.1)	2,180 (22.6)	1,090 (25.7)	1,176 (25.8)
Lung	29,792 (50.7)	17,218 (52.1)	6,823 (50.2)	5,751 (47.5)
Stage II	3,551 (11.9)	2,139 (12.4)	834 (12.2)	578 (10.1)
Stage III	7,634 (25.6)	4,688 (27.2)	1,655 (24.3)	1,291 (22.5)
Stage IV	18,607 (62.5)	10,391 (60.4)	4,334 (63.5)	3,882 (67.5)
Pancreatic	6,897 (11.7)	4,303 (13.0)	1,531 (11.3)	1,063 (8.8)
Stage II	2,521 (36.6)	1,507 (35.0)	613 (40.0)	401 (37.7)
Stage III	692 (10.0)	469 (10.9)	135 (8.8)	88 (8.3)
Stage IV	3,684 (53.4)	2,327 (54.1)	783 (51.1)	574 (54.0)
Bladder	3,609 (6.1)	1,870 (5.7)	999 (7.4)	740 (6.1)
Stage II	2,000 (55.4)	1,037 (55.5)	531 (53.2)	432 (58.4)
Stage III	639 (17.7)	335 (17.9)	196 (19.6)	108 (14.6)
Stage IV	970 (26.9)	498 (26.6)	272 (27.2)	200 (27.0)

(continued on next page)

Table 1. Patient and Index Hospitalization Characteristics by Discharge Setting (cont.)

Characteristic	All n (%)	Home n (%)	Home Healthcare n (%)	SNF n (%)
Healthcare utilization before index admission				
≥1 SNF stays	5,181 (8.8)	1,279 (3.9)	800 (5.9)	3,102 (25.6)
Visit with oncologist	16,936 (28.8)	9,763 (29.5)	4,351 (32.0)	2,822 (23.3)
Chemotherapy	9,584 (16.3)	5,588 (16.9)	2,529 (18.6)	1,467 (12.1)
Radiotherapy	6,641 (11.3)	3,652 (11.1)	1,803 (13.3)	1,186 (9.8)
Targeted chemotherapy	1,131 (1.9)	669 (2.0)	281 (2.1)	181 (1.5)
Index hospital characteristics				
Location				
Urban (vs rural)	53,137 (91.2)	29,746 (90.1)	12,401 (92.1)	10,990 (90.7)
Type				
Teaching (vs nonteaching)	32,107 (55.1)	17,847 (54.5)	7,767 (57.7)	6,493 (53.6)
Index stay DRG (top 10 listed, *surgical)				
*330 Major small and large bowel procedures with CC	7,117 (12.2)	3,704 (11.3)	1,768 (13.1)	1,645 (13.6)
181 Respiratory neoplasms with CC	3,441 (5.9)	2,117 (6.4)	730 (5.4)	594 (4.9)
180 Respiratory neoplasms with MCC	3,196 (5.5)	1,563 (4.7)	840 (6.2)	793 (6.6)
*329 Major small and large bowel procedures with MCC	2,767 (4.7)	615 (1.9)	762 (5.6)	1,390 (11.5)
*331 Major small and large bowel procedures without CC/MCC	2,477 (4.2)	1,813 (5.5)	428 (3.2)	236 (2.0)
*164 Major chest procedures with CC	2,276 (3.9)	1,399 (4.3)	623 (4.6)	254 (2.1)
*167 Other respiratory system OR procedures with CC	1,437 (2.5)	895 (2.7)	350 (2.6)	192 (1.6)
*166 Other respiratory system OR procedures with MCC	1,315 (2.2)	618 (1.9)	367 (2.7)	330 (2.7)
435 Malignancy of hepatobiliary system or pancreas with MCC	1,276 (2.2)	798 (2.4)	283 (2.1)	195 (1.6)
375 Digestive malignancy with CC	1,258 (2.1)	898 (2.7)	180 (1.3)	180 (1.5)

Data were rarely missing (<1%, except SES variables ~4%). *P* values are not shown because all comparisons were highly significant due to the large sample size. Abbreviations: CC, complication or comorbidity; DRG, diagnosis-related group; MCC, major complication or comorbidity; OR, operating room; SES, socioeconomic status; SNF, skilled nursing facility.

Patient Outcomes

Of SNF discharges, 21%, 17%, and 2% went on to receive chemotherapy, RT, and targeted chemotherapy, respectively, compared with 54%, 28%, and 6%, respectively, among home discharges. Furthermore, 56% of SNF discharges died within 6 months of hospitalization compared with 36% of patients who discharged home (Figure 2A, B). Thirty-day readmission rates were 29% and 28% for SNF and home discharges, respectively, and 12% of patients in hospice received <3 days of hospice care before their death regardless of their discharge location. Patients who had a major bowel surgery seemed more likely to require SNF care after hospitalization.

A total of 29% of unestablished patients who discharged to an SNF went on to receive any cancer treatment (chemotherapy, RT, targeted chemotherapy) compared with 60% of patients discharged home (Table 2).

For patients with a known cancer diagnosis and receipt of prior treatment, 42% of those discharged to an SNF went on to receive any further cancer treatment compared with 74% of those discharged home (Table 3).

Predictors of SNF Success

For unestablished patients, those with lung, pancreatic, and bladder cancer were more likely to receive any further treatment compared with those with colorectal cancer. Unestablished patients with stage III cancer were more likely to receive future treatment compared with those with stage IV cancer. Both established and unestablished patients with stage II cancer were less likely to receive future oncologic treatment compared with those with stage IV cancer. Both established and unestablished patients with cognitive impairment were less likely to receive future treatment.

Figure 2. Kaplan-Meier survival curves for patients with (A) unestablished and (B) established cancer. Abbreviation: SNF, skilled nursing facility.

For all patients discharged to an SNF, stage II and III cancer was associated with a lower risk of death and longer time to death (measured in months), indicated by a lower hazard of death compared with stage IV cancer. For established patients with cancer, those who had received chemotherapy before their index hospitalization were less likely to die compared with those who had received no treatment before index admission (Table 4).

Discussion

This study describes postacute care outcomes of patients with stage II–IV colorectal, lung, pancreatic, and bladder cancer discharged to an SNF after an acute care

hospitalization. Data show that these patients are significantly less likely to go on and receive cancer treatment of any kind and are more likely to die within 6 months of discharge compared with patients discharged home. Only approximately one-fifth of patients discharged to an SNF received subsequent chemotherapy compared with slightly more than half of patients discharged home. This analysis also shows how ill this cancer population is: 42% of all patients who had an acute care hospitalization who were discharged to home, home with healthcare services, or an SNF had died within 6 months of discharge.

Although these findings are not unexpected, the magnitude of difference in outcomes of patients who

Table 2. Outcomes at 6 Months for Patients With Unestablished Cancer (N=41,834)

	Home n (%)	Home Healthcare n (%)	SNF n (%)	P Value	Adjusted $\pm$ OR (95% CI) vs Home			
					Home Healthcare	Adjusted P Value	SNF	Adjusted P Value
Patients, n	23,294	9,241	9,299					
Any treatment (n=4,116) ^a	13,646 (59.5)	4,530 (50.0)	2,649 (28.8)	<.001	0.78 (0.73–0.82)	<.001	0.40 (0.37–0.42)	<.001
Any chemotherapy infusion (n=4,121) ^a	11,677 (50.9)	3,592 (39.6)	1,675 (18.2)	<.001	0.74 (0.70–0.79)	<.001	0.32 (0.30–0.34)	<.001
Radiotherapy (n=4,176) ^a	6,279 (27)	2,251 (24.4)	1,490 (16)	<.001	0.94 (0.88–1.00)	.040	0.66 (0.62–0.71)	<.001
Targeted chemotherapy (n=4,175) ^a	1,265 (5.4)	448 (4.9)	194 (2.0)	<.001	0.89 (0.78–1.004)	.060	0.41 (0.34–0.48)	<.001
Death 6 mo after admission	8,178 (35.1)	3,966 (42.9)	5,141 (55.3)	<.001	1.36 (1.28–1.45)	<.001	2.49 (2.31–2.67)	<.001
Hospice use 6 mo after admission (n=1,728) ^b	5,159 (63.1)	2,619 (66.0)	2,706 (52.6)	<.001	1.14 (1.05–1.24)	.003	0.64 (0.59–0.70)	<.001
Hospice LOS <3 d (n=1,048) ^c	616 (11.9)	3,07 (11.7)	368 (13.6)	.060	1.01 (0.86–1.17)	.950	1.22 (1.05–1.42)	.010
30-d readmission	6,693 (28.7)	2,699 (29.2)	2,688 (28.9)	.690	1.00 (0.95–1.06)	.980	1.03 (0.97–1.09)	.370

^a prior treatment (prior chemotherapy, prior radiotherapy, and prior targeted chemotherapy; or prior any therapy for any treatment outcome), discharge year, cancer type and stage, histologic grade, patient age at index admission, months between diagnosis and index admission, male sex, white non-Hispanic race, urban location, index hospital region and characteristics, prior hypertension, prior diabetes, prior chronic obstructive pulmonary disease, prior heart disease, prior stroke, prior cognitive disorder, index admission LOS, Charlson comorbidity index categories, per capita income, median income, percent of non–high school graduates, percent of residents below poverty level, married or partnered relationship status, prior depressive disorders, prior alcohol use disorder, prior drug use, and prior tobacco use. Abbreviations: LOS, length of stay; OR, odds ratio; SNF, skilled nursing facility.

^bExcludes few cases with data error where prior cancer treatment is indicated.

^cPatients who died.

^dPatients who received hospice before death.

Table 3. Outcomes at 6 Months for Patients With Established Cancer (N=16,936)

	Homen (%)	Home Healthcare n (%)	SNF n (%)	P Value	Adjusted ± OR (95% CI) vs Home		
					Home Healthcare	Adjusted P Value	Adjusted P Value
Patients, n	9,763	4,351	2,822				
Any treatment					0.72 (0.67–0.79)	<.001	0.39 (0.35–0.43)
Prior receipt (n=10,648) ^a	4,483 (73.5)	1,772 (63.3)	736 (42.1)	<.001			<.001
Chemotherapy					0.71 (0.66–0.77)	<.001	0.34 (0.30–0.38)
Prior receipt (n=8,963) ^a	3,615 (68.9)	1,358 (57.7)	447 (32.9)	<.001			<.001
Radiotherapy					0.83 (0.76–0.91)	<.001	0.66 (0.59–0.75)
Prior receipt (n=6,570) ^a	1,496 (41.5)	553 (30.9)	299 (25.4)	<.001			<.001
Targeted chemotherapy					0.71 (0.58–0.85)	<.001	0.44 (0.33–0.57)
Prior receipt (n=1,054) ^a	287 (45.6)	93 (35.6)	36 (22.1)	<.001			<.001
Death 6 mo after admission	3746 (38.4)	1,902 (43.7)	1,599 (56.7)	<.001	1.46 (1.34–1.59)	<.001	2.51 (2.27–2.78)
Hospice use 6 mo after admission (n=7,247) ^b	2,484 (66.3)	1,231 (64.7)	907 (56.7)	<.001	0.93 (0.82–1.05)	.230	0.68 (0.59–0.78)
Hospice LOS <3 d (n=4,622) ^c	255 (10.3)	123 (10.0)	122 (13.5)	.020	0.94 (0.74–1.18)	.580	1.28 (0.999–1.63)
30-d readmission	2,403 (24.6)	1,245 (28.6)	823 (29.2)	<.001	1.20 (1.10–1.31)	<.001	1.20 (1.07–1.34)

± prior treatment (prior chemotherapy, prior radiotherapy, and prior targeted chemotherapy; or prior any therapy for any treatment outcome), discharge year, cancer type and stage, histologic grade, patient age at index admission, months between diagnosis and index admission, male sex, white non-Hispanic race, urban location, index hospital region and characteristics, prior hypertension, prior diabetes, prior chronic obstructive pulmonary disease, prior heart disease, prior stroke, prior cognitive disorder, index admission LOS, Charlson comorbidity index categories, per capita income, median income, percent of non-high school graduates, percent of residents below poverty, married or partnered relationship status, prior depressive disorders, prior alcohol use disorder, prior drug use, and prior tobacco use. Abbreviations: LOS, length of stay; OR, odds ratio; SNF, skilled nursing facility.

^aPatients who received cancer treatment before index hospitalization.

^bPatients who died.

^cPatients who received hospice before death.

discharge to an SNF compared with those who discharge home is striking. This analysis of SEER-Medicare data confirms previous research of SNF populations in general.^{5–7} Patients who discharge to an SNF are more frail, older, and have more comorbidities than those who discharge home. Thus, poorer outcomes in the SNF population of this study are not unexpected but rather most congruent with their projected outcomes based on their clinical morbidities. Although we attempted to adjust for patient-level differences, including hospital characteristics, the cohorts are inherently different, and the discharge location essentially serves as a surrogate for functional status. The intent of this study was to understand the impact of discharge location, as a surrogate for function, on subsequent rates of cancer-directed treatment. ASCO recommends against the use of chemotherapy in patients with solid tumors who have not benefited from prior treatment and who have an ECOG¹⁵ performance status (PS) score ≥ 3 .¹⁶ These findings suggest that if the intent of sending this patient population to an SNF is to recover functional status and receive cancer-directed therapy, most patients will not realize this goal.

Discharging patients with cancer who have a poor prognosis to an SNF setting hinders their ability to express their goals of care and to participate in end-of-life

planning because of the limited access to palliative care in SNFs. Previous studies have shown that oncologists struggle with communicating prognosis and with saying “no” to continued chemotherapy treatment in patients with end-stage cancer.^{17,18} This struggle likely contributes to the poor prognostic understanding and unrealistic expectations patients experience at the end of life. The proportion of patients using short-term hospice services (≤ 3 days) decreased from 9.8% in 2009 to 7.7% in 2015.¹⁹ Our study revealed that 13.6% and 11.9% of patients who discharged to an SNF or home, respectively, had a hospice LOS < 3 days. These numbers are higher than national averages for both discharge locations (SNF and home). It is possible that the standard Medicare requirement to select either hospice or SNF care may lead to lower hospice enrollment. The Medicare Care Choices Model, allowing for concurrent hospice and cancer-directed treatment, might increase hospice utilization in this population.²⁰

This study reveals differences between patients with established cancer and those who were newly diagnosed with cancer. Patients with unestablished cancer were less likely to receive future oncologic treatment at all discharge locations compared with patients with established cancer who had received

Table 4. Predictors of SNF Success in Outcomes at 6 Months for Patients With Established Cancer

Variable	Any Treatment OR (95% CI)	Death OR (95% CI)	Hospice OR (95% CI)	Hospice LOS <3 D OR (95% CI)	30-D Readmission OR (95% CI)	Months to Death HR (95% CI)
Patients, n	1,411	1,397	805	460	1,397	1,397
	c=0.64	c=0.75	c=0.66	c=0.57	c=0.62	
Male (vs female)		1.66 (1.30–2.11)				1.22 (1.08–1.37)
Age at index admission	0.96 (0.94–0.98)					1.02 (1.01–1.02)
Months between diagnosis and index admission	0.95 (0.93–0.97)					
White non-Hispanic race (vs other)			1.54 (0.99–2.38)			
Married or partnered (vs nonmarried)						
Urban location			1.85 (1.15–2.98)			1.27 (1.00–1.61)
SES						
Per capita income (\$1,000 USD)						
Median income (\$1,000 USD)						
% of residents below poverty level						
% of non-high school graduates						
Charlson comorbidity index categories					1.16 (1.04–1.29)	
Cancer type (vs colorectal)						
Lung		2.83 (2.05–3.92)			1.32 (0.97–1.79)	1.85 (1.53–2.22)
Pancreatic		3.55 (2.23–5.65)			1.07 (0.68–1.69)	2.36 (1.86–3.00)
Bladder		1.66 (0.93–2.97)			2.07 (1.26–3.41)	1.2 (0.87–1.70)
Cancer stage (vs stage IV)						
II	0.60 (0.45–0.80)	0.31 (0.22–0.42)			0.74 (0.54–1.02)	0.52 (0.44–0.61)
III	0.94 (0.73–1.22)	0.33 (0.24–0.44)			0.71 (0.53–0.94)	0.55 (0.47–0.63)
Histologic grade ^a (vs 9)						
1		0.33 (0.17–0.64)				0.54 (0.38–0.76)
2		0.55 (0.39–0.77)				0.71 (0.59–0.85)
3		0.74 (0.54–1.002)				0.87 (0.75–1.01)
4		1.28 (0.71–2.31)				1.02 (0.75–1.40)
Before index admission						
≥1 SNF stays						
Any therapy						
Chemotherapy		0.67 (0.52–0.87)				
Radiotherapy		1.68 (1.28–2.20)				1.18 (1.04–1.34)
Targeted chemotherapy			2.34 (1.18–4.62)			
Hypertension		0.74 (0.55–0.99)				0.82 (0.72–0.94)
Diabetes						
COPD						1.16 (1.02–1.32)
Heart disease						
Stroke			0.47 (0.25–0.89)			
Cognitive disorder	0.44 (0.27–0.69)	1.84 (1.17–2.88)				
Alcohol use disorder					2.39 (1.23–4.63)	
Depressive disorder			1.60 (1.08–2.38)			

(continued on next page)

Table 4. Predictors of SNF Success in Outcomes at 6 Months for Patients With Established Cancer (cont.)

Variable	Any Treatment OR (95% CI)	Death OR (95% CI)	Hospice OR (95% CI)	Hospice LOS <3 D OR (95% CI)	30-D Readmission OR (95% CI)	Months to Death HR (95% CI)
Index hospital						
Region (vs West)						
Northeast			1.98 (1.40–2.81)			
Midwest			3.90 (2.21–6.88)			
South			1.86 (1.20–2.88)			
Location: urban (vs rural)					2.01 (1.22–3.33)	0.69 (0.53–0.91)
Type: teaching (vs nonteaching)		0.76 (0.60–0.96)				0.85 (0.76–0.96)
LOS			0.96 (0.94–0.99)	0.92 (0.86–0.99)	1.03 (1.01–1.05)	
Discharge year						

Abbreviations: COPD, chronic obstructive pulmonary disease; HR, hazard ratio; LOS, length of stay; NOS, not otherwise specified; OR, odds ratio; SES, socioeconomic status; SNF, skilled nursing facility.

*Grade 1, well-differentiated/differentiated, NOS; Grade 2, moderately differentiated/moderately well-differentiated/intermediate differentiation; Grade 3, poorly differentiated; Grade 4, undifferentiated/anaplastic; Grade 9, differentiation not determined, not stated, or not applicable.

prior oncologic treatment of any kind. We posit that the functional decline that patients with unestablished cancer experience is primarily driven by the malignancy itself, whereas patients with established cancer and exposure to cancer-directed therapy might experience functional decline as a result of their treatment or a complication of treatment and thus might be more likely to regain functional strength to receive future cancer-directed therapy after an SNF stay.

Results of this study should prompt consideration of the financial implications of discharging patients with cancer with functional decline to an SNF. Although readmissions were not statistically different between the discharge locations, 29% of patients were readmitted within 6 months of their acute care hospitalization. High hospital readmission rates from the postacute care setting have become exceedingly problematic for hospitals and SNFs, because they now receive financial penalties for these readmissions and lower quality metrics. This is largely being driven by the Medicare Hospital Readmissions Reduction Program and the increasing prevalence of bundled payments and shared-savings programs since the passage of the Patient Protection and Affordable Care Act.^{21,22} Feder et al²³ studied hospital and SNF clinicians' perceptions of goals-of-care discussions for patients discharged to an SNF and found that discordant goals of care among patients, family members, and clinicians were perceived to contribute to poor patient outcomes at SNFs and to increased hospital readmissions.

Our study has several limitations. The SEER-Medicare dataset is a secondary claims database that does not provide a measure of functional status or social support, which are both factors that might influence disposition after acute care hospitalization and the outcomes

we measured. We do not know the goals of patients discharging to an SNF. Regardless, the Centers for Medicare & Medicaid Services has set up a reimbursement infrastructure with the view that SNFs are to serve a rehabilitative function. Our analysis of SEER-Medicare data from 2010 to 2013 occurred immediately before the increase in immunotherapy use—a treatment that might not have the same PS requirements as traditional cytotoxic chemotherapy. Preliminary research has shown that older patients with an ECOG PS of ≥ 2 had poor outcomes despite receipt of immunotherapy and that overall survival was primarily driven by a patient's ECOG PS.²⁴ Further research is needed to understand the relationship between immunotherapy and functional outcomes, because these patient populations were underrepresented in clinical trials involving immunotherapies.²⁵ We note that patients with earlier-stage disease might have received surgery as primary treatment and might not have been candidates for adjuvant treatment. Evaluating post-acute care outcomes of patients with cancer undergoing primary surgical treatment is an important line of inquiry but beyond the scope of this article. Finally, future receipt of outpatient oral cancer-directed therapy was not captured in this study because oral medications are covered by Medicare Part D and these claims were not analyzed.

Conclusions

Our study shows that most patients with stage II–IV colorectal, lung, bladder, and pancreatic cancer discharged to an SNF are less likely to receive cancer-directed treatment and more likely to die compared with those who are functionally able to discharge home. Next steps include better understanding patients' goals of care when discharging to an SNF, and developing and

implementing targeted interventions that improve palliative care delivery models to patients in the SNF setting.

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eAppendix 1: Codes for Treatment Variables

eAppendix 1. Codes for Treatment Variables

Variable	ICD-9 Diagnosis Codes	ICD-9 Procedure Codes	HCPCS codes	Revenue Codes	NDC Codes
Radiotherapy	V58.0	92.21–92.29, 92.30–92.39, 92.41	76370, 76950, 77014, 77261–77263, 77280, 77285, 77290, 77295, 77299–77301, 77305, 77310, 77315, 77321, 77326–77328, 77331–77334, 77336, 77338, 77370–77373, 77399, 77401–77499, 77520, 77522, 77523, 77525, 77750–77799, 0073T, 0082T, 0083T, 0182T, 0520F, G0173, G0174, G0178, G0242, G0243, G0251, G0256, G0261, G0273, G0274, G0338–G0340	0330, 0333, 0339, 0342, 0344	
Chemotherapy	V58.1, V58.11, V58.12	00.10, 99.25, 99.28	96400–96599, C8953–C8955, C9127, C9205, C9213, C9215, C9235, C9257, C9414, C9418, C9425, C9427, C9431, C9432, C9440, J8510, J8520, J8521, J8530, J8600, J8610, J8700, J8705, J8999–J9999, Q0083–Q0085, S0177, S9329–S9331, 51720, 61517, 0519F, S0116, Q2024, C9025, C9296, J7527		
Bevacizumab			C9257, J9035, S0116, Q2024		50242006001, 50242006101
Cetuximab			J9055		66733094823, 66733095823
Everolimus			J7527		00078056651, 00078056751, 00078059451, 00078062051, 00078062651, 00078062751, 00078062851
Panitumumab			J9303		55513095401, 55513095501, 55513095601, 59703095601
Ramucirumab			C9025, J9308		00002766901, 00002767801
Ziv-aflibercept			C9296, J9400		00024584001, 00024584003, 00024584101
Palliative care	V66.7				

HCFA specialty codes for any oncology visit: 83, hematology/oncology; 90, medical oncology; 91, surgical oncology; 92, radiation oncology; 98, gynecologist/oncologist.

Abbreviations: HCFA, Health Care Finance Administration; HCPCS, Healthcare Common Procedure Coding System; NDC, National Drug Code.