Published in final edited form as:

Med Care. 2018 December ; 56(12): e90–e96. doi:10.1097/MLR.0000000000000877.

New Opportunities for Cancer Health Services Research: Linking the SEER-Medicare Data to the Nursing Home Minimum Data Set

Kali S. Thomas, PhD[1,2], **Eric Boyd, B.S.**[3], **Angela B. Mariotto, PhD**[4], **Dolly C. Penn, MD**[4], **Michael J. Barrett, MS**[3], and **Joan L. Warren, PhD**[4]

[1]U.S. Department of Veterans Affairs Medical Center, Providence, RI

[2]Brown University School of Public Health, Providence, RI

[3]Information Management Services, Inc

[4]National Cancer Institute

Abstract

Background—The Surveillance, Epidemiology and End Results (SEER)-Medicare data combine clinical information from population-based cancer registries with Medicare claims. These data have been used in many studies to understand cancer screening, treatment, outcomes, and costs. However, until recently, these data included limited information related to the characteristics and outcomes of cancer patients residing in or admitted to nursing homes (NHs).

Objectives—To provide an overview of the new linkage between SEER-Medicare data and the Minimum Data Set (MDS), a NH resident assessment instrument detailing residents' physical, psychological and psychosocial functioning as well as any therapies or treatments received.

Research Design—Descriptive, retrospective cohort study

Subjects—Persons in SEER-Medicare diagnosed with cancer from 2004-2013 were linked to the 2011-2014 MDS, with 17% of SEER-Medicare patients linked to the MDS data. During 2011-2014, we identified 318,617 cancer patients receiving care in a NH and 256,947 cancer patients newly admitted to a total of 10,935 NHs. Of these patients, approximately two thirds were Medicare fee-for-service beneficiaries.

Results—The timing from cancer diagnoses to NH admission varied by cancer. Ninety-three percent of all patients were admitted directly to a NH from an acute care hospital. The majority of patients were cognitively intact, 21% reported some level of depression, and 9% had severe functional limitations.

Corresponding Author and Reprints: Kali Thomas, Box G-S121(6), 121 S. Main Street, Providence, RI, 02912, Phone: 401-863-9036, Fax: 401-863-3489, Kali_Thomas@brown.edu.

DECLARATION OF CONFLICTING INTERESTS

The Authors declare that there are no conflicts of interest.

The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs, the National Institutes of Health, or the United States government.

Conclusions—The new SEER-Medicare-MDS dataset provides a valuable resource for understanding the post-acute and long-term care experiences of cancer patients receiving care in United States NHs.

Keywords

Cancer; Health Services Research; Nursing Home; Medicare; SEER Data

INTRODUCTION

Nursing homes provide many services to cancer patients ranging from post-acute skilled care following a hospitalization, to long-term custodial services, to end-of-life care(1, 2). Much of the understanding we have about cancer patients who receive care in nursing homes is based on studies of palliative and terminal care(3-5). Less is understood about the variation among the population of cancer patients in nursing homes, particularly among those who receive post-acute skilled nursing, rehabilitation, and symptom management. Cancer patients who are discharged from an inpatient hospital to receive post-acute care in skilled nursing facilities receive assistance in everything from performing activities of daily living such as eating, bathing, and dressing, to handling medication and monitoring vital signs. Post-acute care delivered to cancer patients can also include skilled services such as physical and occupational therapy, restorative nursing, and hospice care. Depending on the patient's condition, care can be temporary, such as recovery from cancer-directed surgery, or long term, continuing the rest of a patient's life.

Much of what we know about cancer screening, treatment, and costs for Medicare beneficiaries comes from the linked Surveillance, Epidemiology and End Results (SEER) registry and Medicare data(6). The SEER-Medicare data results from linking patients newly diagnosed with cancer in population-based cancer registries to their Medicare enrollment and claims files. While the SEER-Medicare data are a valuable resource for cancer health services research, these data have limited information about the characteristics and outcomes of cancer patients receiving care in the United States' almost 16,000 nursing homes. The SEER registries collect no information about care in the nursing home and Medicare claims from nursing homes are limited to short-term post-acute care claims for fee-for-service (FFS) patients. Therefore, the growing population of Medicare Advantage (MA) enrollees, currently representing approximately 1/3 of Medicare beneficiaries(7), are excluded as claims data are not available. In addition, the care of Medicare beneficiaries receiving long-term custodial services is not reimbursed by Medicare and thus not included in Medicare data. To enhance information about nursing home residents with cancer, the National Cancer Institute has recently linked the SEER-Medicare files with the Minimum Data Set (MDS), a resident assessment instrument that is completed for all nursing home residents upon admission and following at regular intervals. This expanded data resource enables researchers to ask new questions as they relate to the types of cancer patients in nursing homes, the delivery of nursing home care to cancer patients, and cancer patients' outcomes.

New Contribution

The objective of this paper is to provide an overview of the new SEER-Medicare-MDS dataset in an effort to promote research to better understand the characteristics, outcomes, and quality of care for cancer patients who receive post-acute, hospice, or long-term care in nursing homes. The overview includes a description of the linkage of the SEER-Medicare data to the MDS and characteristics of cancer patients receiving care in a nursing home. We also discuss the potential uses of this new data resource for cancer health services research.

METHODS

Data Sources

SEER-Medicare—The Surveillance, Epidemiology and End Results (SEER) data are obtained from population-based cancer registries that are funded by the National Cancer Institute. The SEER registries collect clinical information about all incident cancers occurring in patients living within defined geographic areas, representing approximately 30% of the US population(8). For each patient, the SEER data include demographic information such as age, sex and race; the number of primary incident cancers; month and year of diagnosis; site and stage of disease at diagnosis; type of surgery performed; and vital status. The Medicare data include a unique Health Insurance Claim (HIC) number for each beneficiary, as well as claims for all inpatient hospitalizations, outpatient hospital services, physician services, durable medical equipment, skilled nursing home care, and hospice services for beneficiaries with FFS coverage. Prescription drug information is available for beneficiaries with FFS or MA coverage who have opted to enroll in Medicare Part D. All Medicare claims include dates of service and codes for specific diagnoses, procedures and medications. The SEER and Medicare data are linked biennially. The current version of the SEER-Medicare data includes cancer cases diagnosed from 1973-2013 and Medicare claims through 2014. For persons reported to SEER who were age 65 or older at the time of cancer diagnosis, 94% have been linked to the Medicare enrollment file.

Minimum Data Set (MDS)—The MDS is a standardized, comprehensive assessment instrument that is used for all individuals who receive care in a Medicare and/or Medicaid-certified nursing home, regardless of source of payment. The MDS was implemented in 1990 in response to the Nursing Home Reform Act of 1987 and has provided the basis for care planning, payment, quality monitoring, and research in the nursing home setting. In October 2010, the Centers for Medicare and Medicaid Services implemented version 3.0 of the Minimum Data Set (MDS 3.0) in all certified nursing homes in the United States. The MDS 3.0 captures information about patients' comorbidities, physical, psychological and psychosocial functioning in addition to any treatments (e.g., hospice care, oxygen therapy, chemotherapy, dialysis) or therapies (e.g., physical, occupational, speech, restorative nursing) received. MDS measures have been demonstrated to have strong validity and reliability(9-15). Assessments are conducted by trained nursing home clinicians on all patients at admission and discharge, in addition to other time intervals (e.g., quarterly, annually, and when residents experience a significant change in status). Responses to specific questions are based on input from the patient and the clinician completing the

assessment. Each MDS assessment includes the Medicare beneficiary's unique identification number, an encrypted number created by Medicare to ensure the privacy of beneficiaries.

Linkage of SEER-Medicare data to MDS—We used data from the most current version of the MDS, 3.0, for 2011-2014 linked to the most recent linkage of the SEER-Medicare data, that includes cancer patients diagnosed through 2013. We included cancer cases from 2004-2013 to allow for 10 years of data. The linkage was accomplished through the use of a CMS file that cross walks each cancer patient's unique Health Insurance Claim (HIC) number to their beneficiary identifier that is used to uniquely identify persons in the MDS data. We then assembled all of the MDS assessments for each SEER-Medicare-MDS matched patient from a total of 10,953 facilities. The NCI's Institutional Review Board, the Center for Medicare and Medicaid Services, and each of the SEER Registries approved linkage of SEER-Medicare and MDS data.

Analytic Samples and Analysis—From the population of SEER-Medicare beneficiaries with at least one MDS assessment over the period of 2011-2014, we developed two different analytic samples: 1) All SEER-Medicare patients receiving care in the nursing home, 2011-2014; and 2) All SEER-Medicare patients newly admitted to a nursing home after January 1, 2011. Patients could have multiple MDS assessments during their nursing home stay. We included MDS data from the first assessment, or "target" assessment, appearing for patients during the period 2011-2014. For the population of patients newly admitted to nursing homes, the target assessment was identified as the first full assessment during their first episode of care. MDS assessments are performed on all patients whether they have FFS or MA coverage. However, for persons included in the SEER-Medicare data, claims are only available for Medicare beneficiaries who have FFS coverage. We present findings for the subgroup of patients who had Medicare FFS coverage during the month of their target assessment in an online appendix.

We summarized the characteristics of SEER-Medicare patients in nursing homes with standard descriptive measures including medians, means, standard deviations, frequencies and proportions. Characteristics from the SEER-Medicare data included patient demographics, the type of cancer, and date of diagnosis. We present information from the MDS assessments of new admissions including source of admission, the presence of selected comorbid conditions, summary measures of functional and cognitive impairment, mental health, and length of stay. Functional impairment was determined from a 28-point Activities of Daily Living (ADL) scale where 0 = Total Independence and 28 = Total Dependence(16). Cognitive impairment was derived from a Cognitive Function Scale with four categories ranging from cognitively intact to severely impaired(17). Depression severity was assessed using the Patient Health Questionnaire 9-Item Depression Screener (PHQ-9 and PHQ-9 OV)(10). In addition, we present information on the number and proportion of residents with a prognosis of less than 6 months as assessed by a physician, and the percent of patients that ever received hospice services in the nursing home. We also calculated the time between the date of admission (from the MDS) and the date of cancer diagnosis (from the SEER-Medicare data). We present the median time and months from cancer diagnosis to

the date of admission during this time period, ranging from an admission 1+ month before diagnosis to 60+ months after the cancer diagnosis.

Finally, we present information about the geographic variation in nursing home use for SEER-Medicare cancer patients. We calculated the number of nursing homes providing services to cancer patients, by state, and then estimated the mean, median and range of SEER-Medicare cancer patients per nursing home. Data are presented separately for states in the SEER and non-SEER areas. Creation of these linked data was approved by the National Cancer Institute Institutional Review Board and the Center for Medicare and Medicaid Services.

RESULTS

We identified 1,887,592 individuals in the SEER-Medicare data who were diagnosed with cancer between 2004-2013 and were alive January 1, 2011. Of these, we matched 16.8% (n=318,617) SEER-Medicare patients to the 2011-2014 MDS. Of these matches, 256,947 cancer patients were newly admitted to nursing homes during this time period (Table 1). Among new admissions, 191,465 were Medicare FFS beneficiaries (see Table 2) and of the individuals with a nursing home stay during the time period, 223,586 were Medicare FFS beneficiaries (Table 2). The cancers with highest incidence in the U.S., namely breast, prostate, lung, and colorectal cancers, made up the greatest number of stays and admissions during this time period. Among SEER-Medicare patients, those lung, pancreatic, and colon cancers were the most likely to receive nursing home care during this time period.

Among all stays and new admissions, the majority were female, white, and over the age of 80 years (Table 2). The largest share of SEER-Medicare beneficiaries in nursing homes were from the Greater California and New Jersey regions. Almost 43% of all stays and new admissions to nursing homes between 2011 and 2014 were patients diagnosed with cancer between 2011-2013. Of all of the SEER-Medicare patients, females were more likely to receive nursing home care during this time period (19%, see Table 2), as were SEER-Medicare patients age 80+ years (38.4%) and those living in Connecticut and New Jersey (24% and 23.1%, respectively).

From the MDS assessment, of those newly admitted to nursing homes, 93.2% of all patients and 92.9% of FFS patients were admitted directly from an acute care hospital (Table 3; FFS numbers in Online Appendix Table 3). Almost one-third of patients were diagnosed with diabetes and 16% with congestive heart failure. The majority of patients were cognitively intact (58.3%), although 39.1% reported mild to moderate cognitive impairment; 14.6% had a diagnosis of Alzheimer’s disease or dementia. Almost one-quarter of patients exhibited mild to severe depressive symptoms. Only 8.9% of all patients had severe functional limitations, with an average ADL Scale Score of 17.2 (SD=5). An estimated 3.3% of patients had physician documentation of a condition or chronic disease that may result in a life expectancy of fewer than 6 months and 2.8% ever received hospice services while in a nursing home. Of those newly admitted to a nursing home during this time period, 9% had lengths of stay more than 90 days.

The timing from when patients were diagnosed with cancer to when they first entered the nursing home varied by cancer diagnosis (see Table 4). For cancers with poor prognoses, such as pancreatic, lung, and ovarian cancers, over 56%, 44%, and 40%, respectively, were admitted to the nursing home within 12 months after of their diagnosis. However, for patients with cancers that have more favorable prognosis, such as prostate and breast cancer, 10% and 12% of patients, respectively, had a nursing home admission in the year following their cancer diagnosis, with the median time between diagnosis and MDS assessment being 55 and 48 months, respectively.

The concentration of SEER-Medicare patients in nursing homes varied across the country (Table 5). SEER-Medicare patients received care in approximately 70% (N=10,953) of Medicare and Medicaid certified US nursing homes during this time period; 4,547 facilities were located in SEER registry states and 6,406 were in non-SEER registry states. The majority (95.1%) of residents received nursing home care in SEER registry states. The median number of SEER-Medicare patients per nursing home was highest in the state of New Jersey followed by Connecticut with 122 and 89 SEER-Medicare patients in a nursing home over this time period, respectively. Of facilities in non-SEER states, Nevada had the highest median number of SEER-Medicare patients per facility with 12 patients.

DISCUSSION

In this paper, we described the SEER-Medicare-MDS data that have been linked and are available to researchers. This new data linkage has the potential to advance the science of cancer health services research, especially in the area of cancer survivorship, as well as post-acute, long-term, and end-of-life care. The MDS data provide rich information not available in claims or registry data such as patients' cognitive status, physical function, and mental health, as we present in this paper. Additional items available in the MDS that will be useful to cancer health services researchers include information about pain, living arrangement, continence, fall history, and nutritional status, as well as treatments (e.g., oxygen therapy, chemotherapy, dialysis) and therapies (e.g., physical, occupational, speech, restorative nursing) received while a nursing home resident. The addition of the MDS data to the population-based SEER-Medicare cancer registry and claims opens the possibility for a wealth of policy and practice-relevant questions, particularly given that the MDS data are available for all Medicare beneficiaries, including the growing population of Medicare Advantage beneficiaries with cancer for whom previous researchers have had little to no information.

Prior SEER-Medicare studies have focused on treatment in acute care hospitals, but have not had available data to understand the post-acute care needs of cancer patients. There is little known about the patterns of care following hospital discharge although many cancer patients, especially those of Medicare-eligible age, need continued care to recover from their cancer surgery. With the addition of the MDS data, researchers can now investigate cancer patients' transitions between settings (e.g., hospital, to nursing home for post-acute care, to home). For FFS patients, the linked SEER-Medicare-MDS data can provide information about acute care services that preceded a nursing home admission as well as claims for hospitalizations that may occur while the patient is in a nursing home.

The SEER-Medicare-MDS linkage allows for a more complete picture of hospice and palliative care delivered to dying cancer patients. Historically, the SEER-Medicare data has included claims for hospice services as billed by hospice providers. The addition of the MDS data allows assessment of a patient's experience in nursing home hospice care, including pain management and mental health.

Other research opportunities with these data include investigating disparities (e,g., race, gender, and urban/rural location) in post-acute and long-term care for cancer patients as well of quality of care for patients with cancer (e.g., untreated pain, medication use, successful discharge to home, and rehospitalization). In addition, researchers can ask questions about trends in cancer care by examining the changes in cancer patient composition and acuity in nursing homes, over time, as well as changes in the treatments delivered to cancer patients in these settings (e.g., hospice, pain management, restorative nursing, physical, and occupational therapies). Finally, researchers can ask questions about certain subgroups, or cohorts, of cancer patients who previously were unable to be identified. For example, subgroups of interest might include cancer patients with cognitive or physical impairments or patients with depression.

There are some limitations to these data worth noting. First, patients with nursing home stays that were too short to have a full assessment completed were not represented in this paper (n=29,123). However, SEER-Medicare-MDS users will be able to identify these patients even if the clinical assessment information is not available. Furthermore, because we relied on the first stay during this time period to identify new nursing home entrants, it is possible that many of these patients with initial short stays are admitted to the nursing home at a later date in which a full assessment is completed and information on their clinical characteristics, functional abilities, and care received is available. Second, because of the significant changes to the MDS 3.0 implemented in the last quarter of 2010, these data only currently include information from 2011-2014 while the SEER-Medicare data are available from 2004-2013. Therefore, the timelines for these two data sources do not currently align. As a result, the MDS data around the time of a cancer diagnosis are limited to patients who were diagnosed from 2011 forward. As more years of SEER-Medicare and MDS data become available, the overlap of cancer data and MDS data will increase, allowing for greater number of patients to assess nursing home use during the peri-diagnostic period. An additional limitation of having the MDS data starting in 2011 is that some patients identified as "newly admitted" to a nursing home in 2011 could have previously received care in a nursing home prior to 2011.

In conclusion, these data provide detailed, valuable information not previously available for cancer patients who receive either post-acute or long-term care in U.S. nursing homes. Information about obtaining the SEER-Medicare-MDS data can be obtained from the National Cancer Institute(18). The addition of the MDS data to SEER-Medicare files offers many opportunities for exploring new issues related to cancer health services research.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

References

1. Rodin MB. Cancer patients admitted to nursing homes: what do we know? J Am Med Dir Assoc. 2008; 9:149–156. [PubMed: 18294596]
2. Bourbonniere M, Van Cleave JH. Cancer care in nursing homes. Semin Oncol Nurs. 2006; 22:51–57. [PubMed: 16458183]
3. Buchanan RJ, Choi M, Wang S, et al. Analyses of nursing home residents in hospice care using the minimum data set. Palliat Med. 2002; 16:465–480. [PubMed: 12465693]
4. Hunnicutt JN, Tjia J, Lapane KL. Hospice Use and Pain Management in Elderly Nursing Home Residents With Cancer. J Pain Symptom Manage. 2017; 53:561–570. [PubMed: 28042063]
5. Johnson VM, Teno JM, Bourbonniere M, et al. Palliative care needs of cancer patients in U.S. nursing homes. J Palliat Med. 2005; 8:273–279. [PubMed: 15890038]
6. Warren JL, Klabunde CN, Schrag D, et al. Overview of the SEER-Medicare data: content, research applications, and generalizability to the United States elderly population. Med Care. 2002:IV–18. 3–18.
7. The Henry J. Kaiser Family Foundation. Medicare Advantage. May 11, 2016. Available at: http://kff.org/medicare/fact-sheet/medicare-advantage/. Accessed April 22, 2017.
8. NIH National Cancer Institute. Surveillance, Epidemiology, and End Results (SEER) Program. Research Data (1973-2013) DCCPS, Surveillance Research Program, Surveillance Systems Branch. Nov, 2015. Available at https://seer.cancer.gov/. Accessed April 22, 2017.
9. Mor V, Intrator O, Unruh MA, et al. Temporal and Geographic variation in the validity and internal consistency of the Nursing Home Resident Assessment Minimum Data Set 2.0. BMC Health Serv Res. 2011; 11:78. [PubMed: 21496257]
10. Saliba D, DiFilippo S, Edelen MO, et al. Testing the PHQ-9 interview and observational versions (PHQ-9 OV) for MDS 3.0. J Am Med Dir Assoc. 2012; 13:618–625. [PubMed: 22796361]
11. Saliba D, Buchanan J, Edelen MO, et al. MDS 3.0: brief interview for mental status. J Am Med Dir Assoc. 2012; 13:611–617. [PubMed: 22796362]
12. Gruber-Baldini AL, Zimmerman SI, Mortimore E, et al. The validity of the minimum data set in measuring the cognitive impairment of persons admitted to nursing homes. J Am Geriatr Soc. 2000; 48:1601–1606. [PubMed: 11129749]
13. Chodosh J, Edelen MO, Buchanan JL, et al. Nursing home assessment of cognitive impairment: development and testing of a brief instrument of mental status. J Am Geriatr Soc. 2008; 56:2069–2075. [PubMed: 19016941]
14. Del Rio RA, Goldman M, Kapella BK, et al. The accuracy of Minimum Data Set diagnoses in describing recent hospitalization at acute care facilities. J Am Med Dir Assoc. 2006; 7:212–218. [PubMed: 16698506]
15. Rahman M, Tyler D, Acquah JK, et al. Sensitivity and specificity of the Minimum Data Set 3.0 discharge data relative to Medicare claims. J Am Med Dir Assoc. 2014; 15:819–824. [PubMed: 25179533]
16. Wysocki A, Thomas KS, Mor V. Functional Improvement Among Short-Stay Nursing Home Residents in the MDS 3.0. J Am Med Dir Assoc. 2015; 16:470–474. [PubMed: 25659622]
17. Thomas KS, Dosa D, Wysocki A, et al. The Minimum Data Set 3.0 Cognitive Function Scale. Med Care. 2015
18. NIH National Cancer Institute, Division of Cancer Control & Population Sciences. Healthcare Delivery Research Program. SEER_Medicare Linked Database. Retrieved from https://healthcaredelivery.cancer.gov/seermedicare/. Accessed Feb 2, 2017.

Table 1

Frequency of SEER-Medicare Patients Diagnosed with Cancer, 2004–2013, with an MDS Assessment 2011–2014, by Cancer Site

	2011		2012		2013		2014		2011–2014		% of all SEER-Medicare patients matched to MDS*
	Patients Newly Admitted to a NH	All Patients in a NH	Patients Newly Admitted to a NH	All Patients in a NH	Patients Newly Admitted to a NH	All Patients in a NH	Patients Newly Admitted to a NH	All Patients in a NH	Patients Newly Admitted to a NH	All Patients in a NH	
Bladder	4,420	6,077	3,731	6,372	3,307	6,349	2,632	5,721	14,090	17,092	20.17
Breast	10,986	15,950	8,975	16,831	8,334	17,454	7,749	17,589	36,044	44,536	14.17
Colorectal	9,866	14,429	7,684	14,513	6,724	14,158	4,211	11,165	28,485	35,782	21.13
Kidney	2,534	3,443	2,077	3,646	1,813	3,617	1,302	3,171	7,726	9,422	17.13
Leukemias	1,981	2,795	1,534	2,704	1,376	2,624	969	2,145	5,860	7,214	18.32
Lung	10,348	14,211	7,917	13,339	6,855	12,291	3,370	7,353	28,490	35,686	24.03
Non-hodgkin lymphoma	3,394	4,577	2,774	4,701	2,698	4,843	1,847	4,059	10,713	12,985	18.33
Ovary	1,009	1,381	788	1,336	708	1,268	412	910	2,917	3,624	19.18
Pancreas	1,819	2,490	1,385	2,307	1,114	1,966	363	772	4,681	5,967	22.30
Prostate	8,925	12,522	7,777	13,625	7,811	14,728	7,371	15,164	31,884	39,241	10.53
Thyroid	587	824	549	921	517	1,000	464	984	2,117	2,578	9.14
Uterus/Endometrium	2,453	3,485	1,993	3,644	1,934	3,782	1,515	3,505	7,895	9,693	15.51
Other cancers	22,556	31,908	17,881	32,216	16,079	31,602	10,685	25,037	67,201	84,020	19.06
Multiple cancers	2,761	3,779	2,416	4,014	2,224	4,108	1,443	3,270	8,844	10,777	19.39
TOTAL	83,639	117,871	67,481	120,169	61,494	119,790	44,333	100,845	256,947	318,617	16.88

Note. NH=nursing home; SEER= Surveillance, Epidemiology and End Results; MDS= Minimum Data Set;

*Percent figures are calculated for the subgroup of SEER-Medicare patients who were alive on January 1, 2011

Table 2

Characteristics of SEER-Medicare Patients Diagnosed with Cancer, 2004–2013 with an MDS Assessment, 2011–2014

	All Patients in a NH		Patients Newly Admitted to a NH		% of all SEER-Medicare patients matched to MDS*
	N	Percent	N	Percent	Percent
Sex					
Male	146894	46.1	117982	45.92	14.9
Female	171723	53.9	138965	54.08	19.0
Race					
White	247455	77.7	201865	78.6	17.5
Black	31764	10.0	24838	9.7	17.2
Hispanic	21201	6.7	15978	6.2	14.7
Asian/PI	14880	4.7	11593	4.5	13.4
Other	3317	1.0	2673	1.0	11.0
Age, years					
<65	26482	8.3	20021	7.8	5.0
65–69	36003	11.3	28817	11.2	9.7
70–74	46045	14.5	37382	14.6	14.2
75–79	56024	17.6	45909	17.9	21.1
80+	154063	48.4	124818	48.6	38.4
Medicare Eligibility					
Fee-For-Service	223586	70.2	191465	74.5	24.5
SEER Registry					
Connecticut	22261	7.0	18319	7.1	24.0
Detroit	17927	5.6	15371	6.0	18.0
Georgia (all)	24517	7.7	20344	7.9	12.0
Greater California	66745	20.9	50454	19.6	16.1
Hawaii	3369	1.1	2742	1.1	11.5
Iowa	15830	5.0	12635	4.9	20.0
Kentucky	21616	6.8	18155	7.1	17.5
Los Angeles	26612	8.4	18857	7.3	16.2
Louisiana	14468	4.5	11315	4.4	12.9

	All Patients in a NH		Patients Newly Admitted to a NH		% of all SEER-Medicare patients matched to MDS*
	N	Percent	N	Percent	Percent
New Jersey	55195	17.3	47055	18.3	23.1
New Mexico	5337	1.7	4330	1.7	12.8
San Francisco/San Jose	20318	6.4	15855	6.2	14.9
Seattle	17477	5.5	15665	6.1	16.1
Utah	6945	2.2	5850	2.3	16.3
Year of Diagnosis					
2004	22491	7.1	17875	7.0	16.3
2005	23115	7.3	18503	7.2	16.1
2006	24357	7.6	19577	7.6	15.7
2007	25496	8.0	20399	7.9	15.2
2008	26503	8.3	21168	8.2	15.1
2009	28244	8.9	22371	8.7	15.0
2010	34871	10.9	27035	10.5	16.5
2011	47611	14.9	38568	15.0	19.4
2012	45316	14.2	37601	14.6	19.3
2013	40613	12.7	33850	13.2	17.9

Note. NH=nursing home; PI=Pacific Islander; SEER= Surveillance, Epidemiology and End Results; MDS= Minimum Data Set; Ages of All Stays and New Nursing Home Admissions come from the date of their MDS assessments. Ages of SEER-Medicare patients come from January 1, 2011.

*Percent figures are calculated for the subgroup of SEER-Medicare patients who were alive on January 1, 2011

Table 3

Admission Source, Comorbidities, Prognosis, Cognitive, and Physical Function Among Patients Newly Admitted to Nursing Homes (2011–2014)

Admission Source n (%)		
Community	11052	4.3
Another NH/swing bed	1895	0.7
Acute care hospital	239409	93.2
Inpatient rehab	2010	0.8
Other	2581	1.0
Comorbid Conditions n (%)		
Stroke	22233	8.7
Congestive Heart Failure	41237	16.0
Hip Fracture	16317	6.4
Alzheimer's Disease/Dementia	37461	14.6
Diabetes	78609	30.6
Depression Severity n (%)		
Minimal or none	184404	71.8
Mild	37280	14.5
Moderate	11614	4.5
Moderately Severe	3637	1.4
Severe	932	0.4
Cognitive Impairment n (%)		
Cognitively Intact	149,776	58.3
Mild Impairment	59,240	23.1
Moderate Impairment	41,002	16.0
Severe Impairment	353	0.1
Functional Impairment		
Severely impaired (ADL Score 23+) − n (%)	22,823	8.9
ADL Score (0=total independence−28 total dependence) − mean (sd)	17.2	5.0
End of Life Status n (%) Prognosis for survival< 6 months	8511	3.3
Ever received hospice service in NH	7292	2.8

Note. Depression severity measured with the Patient Health Questionnaire 9-Item Screener (PHQ-9 and PHQ-9-OV); Cognitive impairment measured with the Cognitive Function Scale; Functional Impairment measured with the 28-point Activities of Daily Living Scale.

NH=Nursing Home; ADL=Activities of Daily Living

Table 4

Timing of First MDS Assessment (2011–2014) Relative to Date of Cancer Diagnosis (2004–2013) Among Patients Newly Admitted to a Nursing Home, by Cancer Site

	Patients	Timing of First MDS Assessment Relative to the Date of Cancer Diagnosis (%)						Median time from DX to first MDS assessment
Cancer site	**N**	**1+ months before (%)**	**Month of or 1 month after (%)**	**2–12 months after (%)**	**13–36 months after (%)**	**37–60 months after (%)**	**60+ months after (%)**	**Months**
Bladder	14090	9.1	7.5	15.0	21.2	18.4	28.8	33
Breast	36044	7.6	3.1	8.8	20.7	21.3	38.6	48
Colorectal	28485	9.6	18.1	13.5	15.7	15.7	27.4	26
Kidney	7726	10.2	12.7	13.4	18.7	17.0	28.1	30
Leukemias	5860	13.8	12.1	14.3	18.7	16.1	25.0	25
Lung	28490	16.3	20.1	24.2	18.1	9.8	11.5	6
Non-hodgkin lymphoma	10713	8.9	12.9	15.6	18.1	16.6	27.9	30
Ovary	2917	12.4	23.9	17.1	16.0	13.3	17.3	9
Pancreas	4681	25.8	27.9	27.8	10.5	3.7	4.3	1
Prostate	31884	5.1	2.8	7.1	18.5	21.4	45.2	55
Thyroid	2117	8.7	4.2	10.5	18.6	19.7	38.3	46
Uterus/Endometrium	7895	8.6	8.5	14.7	20.1	17.0	31.3	34
Other Cancer	67201	12.9	13.3	17.3	19.3	15.1	22.0	19
Multiple- first cancer	8844	7.9	11.2	21.0	20.2	16.0	23.7	23

Note. DX=Diagnosis; MDS=Minimum Data Set

Table 5

Total Number of SEER-Medicare Patients with an MDS Assessment per Nursing Home, by State*

State	Total Number of NHs with at least One SEER-Medicare Patient	Number of SEER-Medicare Patients per NH				
		Median	Min	Max	Mean	SD
SEER Areas						
CA	1398	64	1	1062	102.1	112.1
CT	266	88.5	1	599	103.3	83.9
GA	428	39	1	473	64.1	70.7
HI	49	62	1	298	75.0	76.7
IA	493	26	1	280	36.7	36.6
KY	337	49	1	829	75.4	85.7
LA	311	42	1	739	53.6	61.6
MI	385	6	1	790	60.7	118.8
NJ	432	121.5	1	894	158.0	141.2
NM	90	40	1	406	64.4	69.6
UT	121	51	2	4049	103.7	367.2
WA	237	60	1	420	89.1	95.4
Non-SEER Areas						
AL	145	2	1	111	3.1	9.2
AR	103	1	1	21	1.8	2.2
AZ	146	6	1	28	7.4	6.1
CO	168	2	1	17	3.3	3.0
DE	34	2	1	11	3.0	2.6
FL	672	3	1	27	4.2	4.1
ID	60	2	1	16	3.6	3.3
IL	353	1	1	17	1.9	1.8
IN	261	1	1	15	2.1	2.2
KS	90	1	1	10	1.6	1.3
MA	248	1	1	28	2.5	2.9
MD	146	2	1	17	2.3	2.0
ME	49	1	1	5	1.6	1.0

State	Total Number of NHs with at least One SEER-Medicare Patient	Number of SEER-Medicare Patients per NH				
		Median	Min	Max	Mean	SD
MN	149	1	1	24	2.2	2.4
MO	209	1	1	8	1.7	1.1
MS	83	1	1	12	2.0	1.7
MT	41	1	1	7	1.9	1.4
NC	261	2	1	29	2.3	2.4
ND	15	1	1	3	1.4	0.6
NE	86	2	1	63	4.1	8.0
NH	40	1	1	6	1.8	1.1
NV	51	12	1	79	14.8	14.0
NY	393	2	1	81	3.2	5.6
OH	440	1	1	32	2.3	2.8
OK	110	1	1	4	1.5	0.8
OR	129	3	1	59	4.9	6.4
PA	441	2	1	41	3.3	4.7
RI	44	2	1	11	2.6	2.5
SC	121	2	1	30	3.1	3.7
SD	37	1	1	5	1.6	1.1
TN	211	2	1	75	4.0	6.9
TX	675	1	1	20	2.3	2.3
VA	182	1.5	1	9	2.2	1.7
VT	21	2	1	4	2.0	1.0
WI	114	1	1	4	1.3	0.7
WV	39	1	1	9	1.5	1.5
WY	21	1	1	5	2.0	1.2

*Information for AK and DC is not presented because observations total less than 11.

Note. NH=nursing home; SEER= Surveillance, Epidemiology and End Results; MDS= Minimum Data Set