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Continuity of care and ICU utilization during end of life

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Abstract

Background—There is increasing concern about discontinuity of care across transitions (e.g. from home to hospital) and how that might affect appropriate medical management. We examined the changes over time in outpatient to inpatient continuity in individuals hospitalized with advanced lung cancer and its relationship to end of life ICU use.

Methods—Retrospective analysis of the linked Surveillance, Epidemiology and End Results (SEER) – Medicare database. Subjects were 21,183 Medicare beneficiaries aged 66 years or older diagnosed with Stage IIIB or IV lung cancer between January 1, 1992 and December 31, 2002 who died within a year of diagnosis from 1992 through 2003. Outpatient to inpatient continuity is defined as an inpatient visit by the patient's usual care provider during the last hospitalization. The primary outcome measure is ICU use during the last hospitalization.

Results—Outpatient to inpatient continuity decreased from 60.1% in 1992 to 51.5% in 2002 (p<0.001). Factors associated with decreased continuity included: male gender, black race, low socioeconomic status, being unmarried, treatment by a hospitalist, and treatment in a teaching hospital. ICU use increased by 5.8% per year from 1993–2002. After adjusting for patient characteristics, patients with outpatient to inpatient continuity had a 25.1% reduced odds of spending time in an ICU during the terminal hospitalization.

Conclusion—Outpatient to inpatient continuity of care declined during the 1990s and early 2000s. Patients with terminal lung cancer who experienced continuity of care across the outpatient to hospital settings were less likely to spend time in the ICU prior to death.

Keywords

continuity of care; older adults; lung cancer; ICU use; end of life care; hospitalist

Introduction

Continuity of care is a key attribute of good medical care [1]. Provider continuity is associated with improved patient satisfaction, increased use of preventive care services, fewer emergency room visits, lower hospitalization rates and reduced health care costs[2–16]. For cancer patients,

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it is a desirable attribute of a good patient-physician relationship[17]. Cancer patients with outpatient provider continuity have reduced emergency room visits and are more likely to die out-of-hospital during end of life[18, 19].

American health care has undergone major changes over the past two decades. Some of these changes might threaten continuity of care, whereby a patient has a long-standing relationship with a physician. Such changes include: Health Maintenance Organization (HMO) networks with shifting patient eligibility and physician membership; continued growth of specialists; and the hospitalist movement[20–24]. One type of continuity of care is across transitions: home to hospital, hospital to home, hospital to nursing home, etc. Little is known about outpatient to inpatient continuity. Transitions between care settings jeopardize continuity of care, patient safety, and quality of care[25–28]. A recent study of transitions between care settings during end of life showed that 62% of patients experience one or more transitions during the last 3 months of life[29]. Most of this transition is from home to hospital, raising issues of continuity of care.

Lack of continuity of care may affect health care decisions, in particular, end of life decisions, when trust and values become critical[17]. Physicians unfamiliar with the patient may not know the patient's wishes or values, and may not be good at discussing end of life choices, such as hospice or palliative care[30].

In this study we assessed continuity of care in patients with advanced lung cancer. We addressed the following questions: did outpatient to inpatient continuity of care among advanced lung cancer patients change over time? Also, was lack of outpatient to inpatient provider continuity associated with an increased risk of an ICU stay? Finally, did the growth of hospitalists affect continuity and ICU use? We chose ICU use as an outcome because there has been general concern about its overuse during end of life care[31–34].

Methods

Data Source

This is a retrospective study of lung cancer patients identified from the linked Surveillance, Epidemiology and End Results (SEER)-Medicare database for the years 1992–2002[35]. We included the original SEER registries, encompassing 14% of the United States population from the 11 geographic regions: the states of Connecticut, Hawaii, Utah, New Mexico and Iowa, and the metropolitan areas of San Francisco/Oakland, Los Angeles, and San Jose/Monterey (California), and the municipalities of Detroit, MI; Seattle, WA; and Atlanta, GA. For all incident cancers diagnosed in these areas, the SEER registries collect information on patient demographics, tumor characteristics, stage at diagnosis, date of diagnosis, therapy received within four months of diagnosis, and date and cause of death.

Through a collaborative project between the National Cancer Institute and the Centers for Medicare and Medicaid Services (CMS), entitlement information and claims data from the Medicare program were linked to the SEER data for cancer patients aged 65 and older. Medicare eligibility could be identified for 93% of SEER patients aged 65 and older[36].

Data from multiple files were used for this study: 1) the Patient Entitlement and Diagnosis File (SEER registry data and Medicare entitlement information); 2) Medicare Provider Analysis and Review file (hospital inpatient and skilled nursing facility stays), 3) Outpatient Standard Analytic File (hospital outpatient services), and 4) 100% Physician/Supplier File (physician and other medical services); and 5) a Hospital File created by NCI with information on hospital characteristics from the CMS Provider of Service (POS) survey and the Healthcare Cost Report.

Study Cohort

Eligible subjects were selected from the Patient Entitlement and Diagnosis File and included patients who were: 1) diagnosed with stage III B or stage IV lung cancer from 1992 – 2002, 2) 66 years or older at the time of diagnosis, 3) died within one year of diagnosis over the period 1993 – 2002, 4) enrolled in Medicare Parts A and B one year prior to death, 5) hospitalized in the last six months of life, and 6) had at least 3 or more visits to one provider in a year prior to the admitting date of the last hospitalization (Figure 1). We limit our analysis to the original SEER sites that have provided continuous data from 1992 to 2002. Individuals enrolled in an HMO at any time from date of diagnosis through date of death were excluded, because of concerns about completeness of information in the Medicare files of these patients.

Measures

Information on patients' socio-demographic characteristics was obtained from the SEER data: age (66–74, 75–84, ≥85), race (non-Hispanic white, Black, Hispanic, Other), gender, and marital status at the time of diagnosis (married, not married). Tumor stage, vital status, cause of death, and geographic region were also derived from SEER data. Residence was dichotomized into large metropolitan area vs. others. A large metropolitan area has an average population of over one million based on the 1990 census. Socio-economic status is based on whether the patient was eligible for state buy-in coverage provided by the Medicaid program for at least one month during the index year. Comorbidity was measured with a score developed by Klabunde et al. using all Medicare claims from the year prior to diagnosis[37].

Establishment of Usual Care Provider (UCP)—HCFA Common Procedure Terminology (CPT) evaluation and management codes 99201 to 99205 (new patient) and 99221 to 99215 (established patient encounters) were used to establish outpatient visits. The individual providers were determined using the Unique Provider Identification Number (UPIN). Three or more visits to the same provider within a year prior to last hospitalization established the usual care providers for the patient. By this definition a patient could have more than one UCP. UCPs were classified as primary care physicians or others. For purposes of this study a primary care physician was a general practitioner, family physician, internist, or a geriatrician.

Definition of outpatient to inpatient continuity of care—An in-patient claim by the UCP during hospitalization established outpatient to inpatient continuity with a provider. Inpatient claims were identified using HCFA- CPT evaluation and management codes 99221 to 99223 (for initial hospital care), 99251 to 99255 (inpatient consultation) and 99231 to 99233 (for subsequent hospital follow-up).

Definition of a hospitalist—There is no provider code for a hospitalist physician in the administrative database. Therefore, we employed a functional definition of hospitalist originally proposed by Saint et al[38]: a physician with >50% of his or her total Medicare claims per year originating from inpatient CPT evaluation and management codes (99221–99223; 99231–99233, 99251–99255). We restricted our analyses to physicians with at least 10 inpatient claims per year and who had either internal medicine or geriatrics as their specialty.

The primary outcome was ICU use during the terminal hospitalization and was ascertained from inpatient hospital claims in the MEDPAR file. Patients with ICU room charges >0 or who had a CPT code for mechanical ventilation during hospitalization were considered as having "ICU use" during the admission.

Hospitals were dichotomized into teaching or non-teaching. Teaching hospitals were hospitals with a major medical school affiliation. Medical school affiliation was ascertained from the

Provider of Services data in NCI's Hospital File. For analyses of ICU use, patients hospitalized in hospitals that did not contain ICU beds (from the Healthcare Cost Report Information System) were deleted (1303 patients).

The study was approved by the Institutional Review Board of University of Texas Medical Branch, Galveston, TX.

Statistical Analysis

The likelihood ratio chi square statistic was used to compare rates of outpatient to inpatient continuity of care by subject characteristics. Changes in outpatient to inpatient continuity over time (year of diagnosis) were initially evaluated with the Cochran Armitage trend test. Multivariate logistic regression analysis was used to assess whether changes in ICU use over time varied by subject, outpatient to inpatient continuity of care and hospital characteristics. A p-value of <0.05 was considered significant. All statistical analyses were performed using SAS version 9.1 (SAS Institute Inc., Cary, NC).

Results

Figure 1 outlines the approach to identifying the study cohort. Of the 28,502 patients diagnosed with advanced lung cancer and hospitalized in the last 6-months of life, 21,183 (74.3%) had three or more visits to the same provider within the year prior to last hospitalization. We defined any provider who saw the patient on three or more different occasions in an outpatient setting as a usual care provider.

Table 1 describes the baseline patient characteristics of the study cohort. Of the patients with a usual care provider (n=21,183), 11,570 (54.6%) had outpatient to inpatient continuity; that is, they were seen during hospitalization by their usual care provider.

Figure 2 shows the percent of patients receiving care from their usual care provider during their final hospitalization. Outpatient to inpatient continuity decreased from 60.1% in 1992 to 51.5% in 2002 (p-<0.0001). Over this same period, the number of patients who received care by a hospitalist increased from 8% to 16% (p<0.0001).

Table 2 presents results of a multivariable analysis of factors associated with outpatient to inpatient continuity. Continuity declined over time. Patient characteristics associated with lower odds of continuity were male gender, black race, being unmarried, and having a low socioeconomic status. Treatment in an academic hospital and inpatient care provided by a hospitalist were also independently associated with a decreased odds of continuity of care.

Of patients with outpatient to inpatient provider continuity, 18.7 % had an ICU stay during their last hospitalization, compared to 22.5 % of patients without provider continuity (p<0.0001). ICU use did not differ whether outpatient to inpatient continuity was by a primary care physician or a specialist, 19.1% vs. 18.5% respectively. Of those who received care by a hospitalist, 33.2% had an ICU stay during the last hospitalization, compared to 19.3% of those who received care by non-hospitalist physicians (p<0.0001).

Table 3 presents the results of a multivariable analysis of factors associated with ICU use in the final hospitalization among patients with advanced lung cancer. After controlling for other relevant factors, patients with outpatient to inpatient continuity had a 25.1% reduced odds of spending time in an ICU. Those seen by a hospitalist during the last hospitalization had 56.7% higher odds of ICU use. Odds of an ICU admission increased approximately 5.8% per year from 1993 to 2002. Higher odds of ICU use were also associated with being married, younger age, low socioeconomic status, higher comorbidity, Hispanic or other ethnicity, and living in large metropolitan areas.

Discussion

For patients with advanced lung cancer, continuity of care across the outpatient to hospital setting declined during the 1990s. Continuity of care (being seen by a usual care provider during hospitalization) was associated with a lower chance of an ICU stay.

Other factors independently associated with a lower odds of outpatient to inpatient continuity of care include male gender, black race, lower socioeconomic status, being unmarried, care in a teaching hospital, and participation of a hospitalist in the care. The lower outpatient to inpatient continuity in teaching hospitals is consistent with the academic model of clinical practice, where rotating attending physicians are responsible for care of hospitalized patients. Our finding on the relationship of hospitalists to reduced continuity of care supports the concern expressed by others that the growth of the hospitalist movement may threaten continuity of care across transitions[39]. The other factors associated with low continuity of care are all commonly recognized to be risk factors for less than optimal medical care.

The decline in continuity of care may reflect the general trend in the United States primary care physician workforce. The number of internal medicine residents choosing primary care has declined from 54% in 1998 to 20% in 2006[40]. The increasing pressure to improve productivity and efficiency further limits the role of primary care physicians to either "officist" or "hospitalist," jeopardizing continuity of care.

In addition to a substantial increase in end of life ICU care over time, odds of ICU care were independently associated with no outpatient to inpatient continuity, care by a hospitalist, younger age, Hispanic or other ethnicity, low socioeconomic status, higher comorbidity and living in a large metropolitan area.

Patients who received care by a hospitalist physician had higher odds of ICU stay during the last hospitalization. These findings should be interpreted in the context of our operational definition of a hospitalist physician. Moreover, we could not ascertain the timing of care provided by the hospitalist during the hospitalization in relation to ICU stay. It is possible that the hospitalist provided care to these patients while in the ICU or after an ICU stay.

Prior studies of hospitalists have shown reduced length of stay and reduced overall hospital costs and no difference or improvements in outcomes such as mortality and readmission rates[41–43]. A meta-analysis by Wachter and Goldman of 19 studies showed a 13.4% reduction in cost and 16.6% reduction in length of stay after initiating hospitalist programs[24]. Despite these improvements in efficiency, the expansion of the hospitalist movement is not without controversy. A major threat of the hospitalist model is the increasing discontinuity of care, from both outpatient-to-inpatient and inpatient-to-outpatient settings[39].

Studies examining the effects of continuity of care have shown improved patient satisfaction, improved health outcomes and reduced health care costs[3–9, 11, 12, 14–16, 44–47]. There has been less work on the effect of continuity of care in end of life settings. Recent studies by Burge et al. showed that cancer patients with higher outpatient continuity with their primary care provider had fewer emergency room visits and were less likely to die in the hospital[18, 19].

Individual patient preferences are often difficult to establish[48–50]. Physicians, nurses and family members differ significantly in their knowledge and understanding of a patient's preferences for end-of-life care[51]. This situation is further complicated by misconceptions of the spiritual, religious and cultural needs of the patient and family members. Honoring patient preferences is critical in providing end-of-life care for terminally ill patients. Thus, familiarity with the patient should improve end-of-life choices.

In our study, the effect of outpatient to inpatient continuity of care on ICU use was similar whether the continuity of care was with a primary care physician or a specialist. This may reflect the patient population with advanced lung cancer, who may be closely followed by a specialist such as oncologist or pulmonologist.

The other factors that were associated with ICU use in our study, such as ethnicity, age, socioeconomic status and comorbidity, are consistent with numerous prior reports[52–55].

Annually 540,000 Americans die using ICU services[31]. As the nation ages, the doubling of individuals older than 65 years of age by 2030 will require increasing demand on ICU services. Currently only 37% of ICU patients receive care from a critical care trained physician[56]. The current supply and projected number of trainees are not sufficient to meet the growing national need, unless better rationing and appropriate ICU use is promoted.

Our study has several limitations. First, while we found associations between lack of continuity of care and end of life ICU use, such associations found in observational data are not necessarily causal. Some unmeasured factors may be responsible for both discontinuity of care and ICU use. This study is limited to ICU use during final hospitalization for advanced lung cancer patients. Our study used administrative data that did not contain information on patient, family, or treating physician attitudes and preferences regarding end of life care. It is difficult for physicians to predict the life span of an individual with advanced lung cancer, even though the median survival of such patients has changed little over the span of the study. Cancer patients often choose treatments based on prognosis, which may be overestimated[57]. Only services billed by the physicians were included, and non-billable "social visits" by the usual care provider during the last hospitalization are not captured in the administrative data sets. However, this deficiency would likely decrease the estimate of association between continuity and ICU use.

We did not examine local health system characteristics that may have played a role in ICU use. It might be that the very factors associated with less continuity are also associated with less advance care planning or preferences for more aggressive care at the end of life. Patients with continuity may be more likely to have advance care planning. Future studies to examine the effect of continuity of care on advance care planning are needed.

These results reflect the Medicare population aged 66 and older with advanced lung cancer and may not be generalizable to other settings or populations. Subjects with HMO coverage were excluded from the study. A change in HMO enrollments during the study period might have affected the analysis of the time trend of outpatient to inpatient continuity of care.

In summary, outpatient to inpatient continuity of care declined during the 1990s and early 2000s, while care by hospitalists increased. Patients with terminal lung cancer who experienced outpatient-to-hospital continuity of care were less likely to spend time in the ICU prior to death. Efforts to improve outpatient-to-inpatient continuity of care in hospitalized patients may reduce end-of-life ICU use in terminally ill patients.

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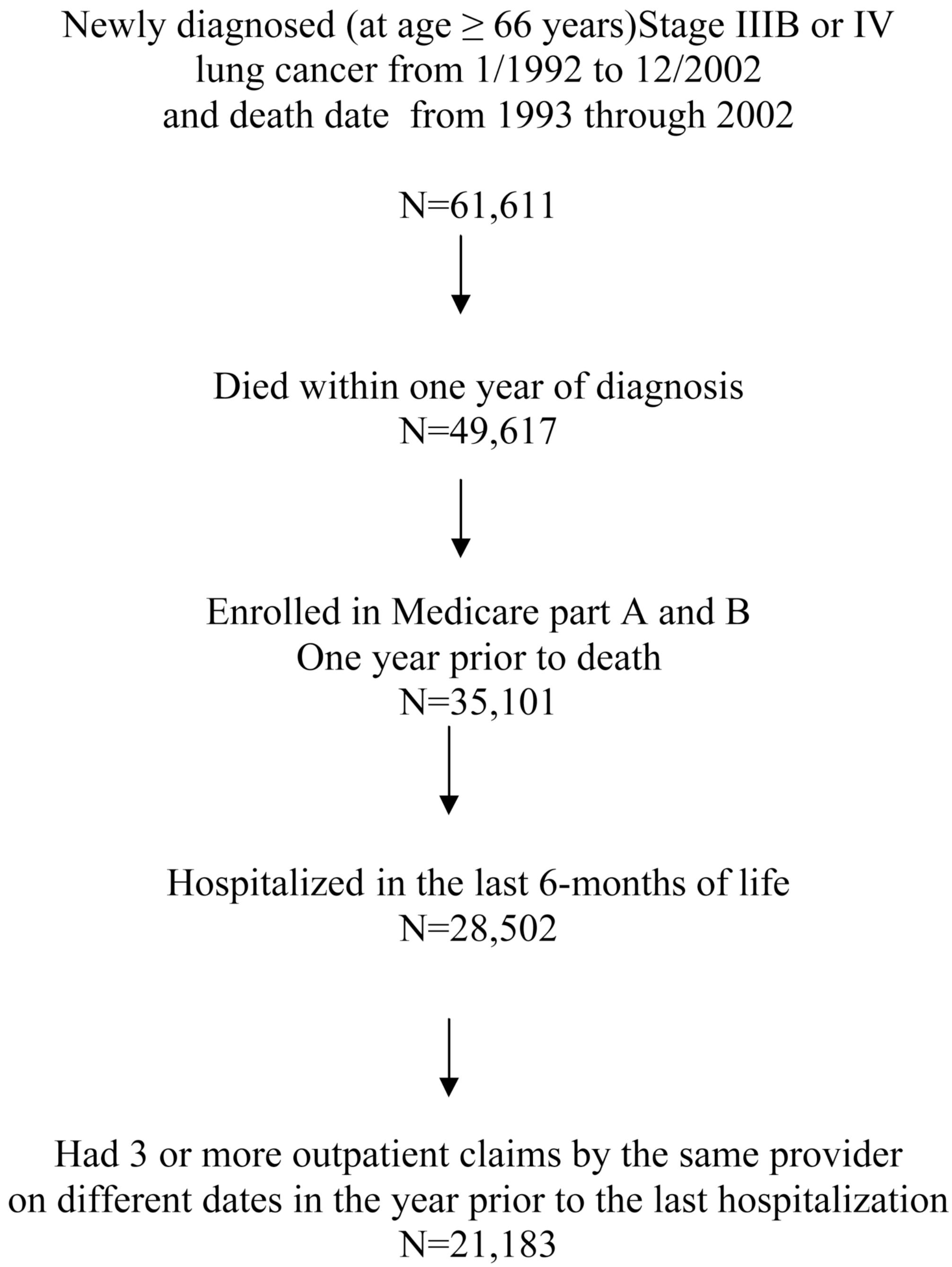

Figure 1.

Establishment of study cohort who died within a year after diagnosis of advanced lung cancer, from 1992 to 2002, and who had a usual care provider

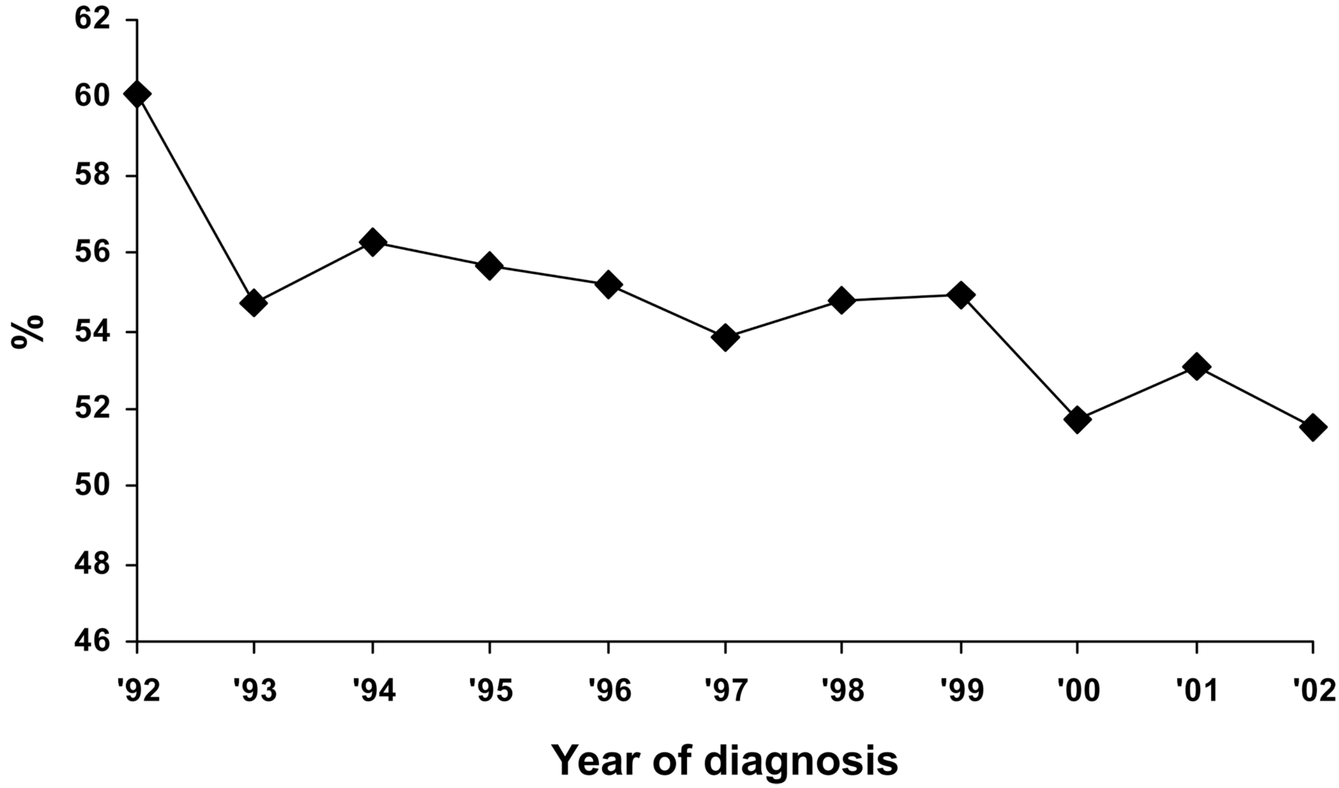

Figure 2.
Percent of patients with advanced lung cancer receiving care by their outpatient provider during their final hospitalization, from 1992 to 2002.*
*Analysis restricted to SEER sites that provided continuous data from 1992 to 2002 (n=21,183). Cochran-Armitage trend test for 1992–2002: p<0.0001

Table 1

Baseline characteristics of the study cohort and percent with outpatient to inpatient continuity of care

Variables	N	Percent with outpatient to inpatient continuity of care	p-value
Overall Cohort	21,183	54.6	
ICU use			
Yes	4,336	50.1	
No	16,847	55.7	<0.0001
Age at Diagnosis (in years)			
66–74	10,298	54.9	
75–84	8,879	54.6	
≥ 85	2006	52.8	0.203
Gender			
Male	11,662	54.5	
Female	9,521	54.7	0.81
Race (%)			
Non-Hispanic White	17,653	55.1	
Black	1,647	46.9	
Hispanic	674	53.1	
Other	1,209	59.6	<0.0001
Married			
Yes	11,265	56.1	
Others	9,918	52.9	<0.0001
SEER site (%)			
Atlanta	1,252	53.9	
Connecticut	2,772	59.1	

Variables	N	Percent with outpatient to inpatient continuity of care	p-value
Detroit	4,258	50.2	
Hawaii	564	64.0	
Iowa	2,969	49.6	
New Mexico	711	45.0	
Seattle	2,350	50.8	
Utah	461	40.1	
California*	5,846	61.4	<0.0001
Low socioeconomic status			
No	17,867	55.3	
Yes	3,316	51.0	<0.0001
Comorbidity score			
=0	10,063	54.0	
=1	6,361	55.0	
≥2	4,759	55.4	0.23
Cause of death			
Lung cancer	18,063	55.4	
Others	3,120	50.2	<0.0001
AJCC Stage			
Stage IIIB	6,775	56.0	
Stage IV	14,408	54.0	0.007
Teaching Hospital			

Variables	N	Percent with outpatient to inpatient continuity of care	p-value
Yes	5,868	49.5	
No	15,315	56.6	<0.0001
Residence			
Large metropolitan area	13,401	55.2	
Others	7,782	56.9	<0.0001

*California includes metropolitan areas of San Francisco/Oakland, Los Angeles and San Jose

Table 2

Multivariable analysis of factors predicting whether a patient experiences continuity of care from the outpatient to the hospital setting

Variables	**Odds ratio (95% CI[§])**
Year of diagnosis (each increasing year)	0.981 (0.972, 0.990)
Age at diagnosis (each increasing year)	0.997 (0.933,1.002)
Gender	
Male	1.0
Female	1.065 (1.004, 1.130)
Race	
Non-Hispanic White	1.0
Black	0.774 (0.695, 0.861)
Hispanic	0.984 (0.839, 1.153)
Others	1.309 (1.154, 1.484)
Low socioeconomic status	
No	1.0
Yes	0.830 (0.764, 0.902)
Teaching hospital	
No	1.0
Yes	0.729 (0.685, 0.776)
Co-morbidity score	
0	1.0
1	1. 053 (0.988, 1.123)
≥2	1.102 (1.026, 1.183)
Married	
No	1.0
Yes	1.122 (1.056, 1.192)
Hospital length of stay	1.022 (1.018, 1.026)
Place of residence	
Non-large metropolitan area	1.0
Large metropolitan area	1.115 (1.051, 1.182)
Seen hospitalist during hospitalization	
No	1.0
Yes	0.935 (0.879, 0.996)

[§]Confidence interval

Table 3

Multivariable analyses of factors associated with ICU use during final hospitalization*

Variables	**Model 1 Odds ratio (95% CI±)**	**Model 2 Odds ratio (95% CI)**
Outpatient to inpatient Continuity of care		
No	1.0	**1.0**
Yes	0.797 (0.745, 0.854)	**0.749 (0.698, 0.804)**
Seen by a hospitalist‡		
No		**1.0**
Yes		**1.567 (1.403,1.751)**
Year of diagnosis (each increasing year)		**1.058 (1.046, 1.071)**
Age at diagnosis(each increasing year)		**0.983 (0.977, 0.988)**
Gender		
Male		**1.0**
Female		**0.948 (0.879, 1.023)**
Race		
Non-Hispanic White		**1.0**
Black		**1.104 (0.972, 1.255)**
Hispanic		**1.289 (1.066, 1.560)**
Others		**1.264 (1.091, 1.463)**
Low socioeconomic status		
No		**1.0**
Yes		**1.146 (1.034, 1.271)**
Teaching hospital		
No		**1.0**
Yes		**0.959 (0.887, 1.038)**
Co-morbidity score		

Variables	**Model 1 Odds ratio (95% CI[±])**	**Model 2 Odds ratio (95% CI)**
0		**1.0**
1		**1.139 (1.048, 1.238)**
≥2		**1.468 (1.345, 1.603)**
Married		
No		**1.0**
Yes		**1.182 (1.093, 1.278)**
Hospital length of stay		**1.046 (1.041, 1.050)**
Place of residence		
Non-large metropolitan area		**1.0**
Large metropolitan area		**1.603 (1.482, 1.733)**

[*] Analyses restricted to the 19,880 patients hospitalized in hospitals that possessed ICU beds.

[±] CI = Confidence interval