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Use of Inpatient Palliative Care Services in Patients With Advanced Cancer Receiving Critical Care Therapies

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Abstract

Background: Invasive mechanical ventilation (IMV), dialysis for acute kidney failure, and other critical care therapies (CCTs) are associated with a high risk for complications in patients with metastatic cancer. Inpatient palliative care (IPC) can assist in assessing patients' preferences for life-prolonging treatment at the end of life. This study investigated the use pattern of IPC, outcomes (in-hospital mortality, length of stay [LOS], discharge destination, and cost of care), and predictors of IPC use in patients with metastatic cancer who received CCTs. We hypothesized that IPC services are underused in this cohort.

Methods: In this retrospective cohort study, we used the 2010 California State Inpatient Databases to identify adults with metastatic cancer who received CCTs that are common and reliably coded (IMV, tracheostomy, percutaneous endoscopic gastrostomy tube, dialysis for acute kidney failure, and total parenteral nutrition). We determined IPC use in all patients, in those who received IMV, and across 4 cancer subtypes (lung, breast, colorectal, and genitourinary). Outcomes were assessed based on IPC use. Multivariable analyses were used to investigate factors associated with IPC use.

Results: We identified 5,862 hospitalizations, 19.8% of which used IPC services. IPC use varied across cancer subtypes (lung, 28.3%; breast, 22.4%; colorectal, 12.8%; genitourinary, 16.1%; *P*<.

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01). Patients who received and did not receive IPC services had high in-hospital mortality rates (63.9% and 29.8%, respectively), and costs of care and LOS were lower in survivors who received IPC compared with those who did not. Predictors of IPC use were lung cancer (vs colorectal or genitourinary cancer), higher comorbidity score, do-not-resuscitate status on admission or within 24 hours of admission, infections (vs cancer-related diagnoses), and higher hospital bed count.

Conclusions: Use of IPC was low in the cohort who received CCTs with poor outcomes, although data on outpatient palliative care services is lacking. Predictors of IPC use may be used to identify patients who may benefit from these services.

Cancer mortality rates have been declining over the past 2 decades, and the observed improvements in survival are partially attributable to advances in treatment options.[1,2] Treatment-associated complications and disease progression have led to an increase in emergency department visits, hospitalizations, and intensive care unit (ICU) admissions during the course of treatment.[3] Critical care therapies (CCTs), such as invasive mechanical ventilation (IMV), can be lifesaving; however, the inherent risks (eg, infections, need for hospitalizations) are higher in patients with advanced cancer given its incurable nature and the frequent need for prolonged treatment.[4,5]

A prior systematic review showed that the integration of palliative care interventions in the care of patients with life-limiting illnesses in the outpatient, acute care, and ICU settings can reduce ICU admissions and length of stay (LOS).[6] In addition, palliative care services have been shown to improve symptom management, quality of life, and survival in some patients with metastatic cancer, and may also help reduce healthcare costs.[7–9] However, the use pattern of inpatient palliative care (IPC) services for patients with advanced cancer receiving CCTs has not been well characterized. In patients with metastatic head and neck cancer, use of IPC services was reported to be 5%.[10] In another study, IPC services were used in 17% of patients admitted to the oncology service.[11] Overall, these rates were low considering the poor prognoses of patients with advanced cancer admitted to the hospital.

In this study of hospitalized patients with metastatic cancer who received CCTs, we investigated IPC use and described outcomes (including in-hospital mortality, LOS, discharge destination, and cost of care) of patients who received IPC services and those who did not, and considered predictors of IPC use. Results were assessed based on IPC use to illustrate the poor outcomes associated with this population. We also looked at the use pattern of IPC services across the 4 most common cancer subtypes in our population (lung, breast, colorectal, and genitourinary). We hypothesized that use of IPC services was low in this cohort of patients.

Methods

Design, Data Source, and Subjects

For this retrospective observational cohort study, data were obtained from the 2010 Healthcare Cost and Utilization Project (HCUP), California State Inpatient Databases (CA SID), created through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). The CA SID contains information on inpatient hospital discharge records from >98% of community hospitals in California. This

information includes principal and secondary diagnoses and procedures, admission and discharge status, patient demographics, expected payment source, total charges, do-not-resuscitate (DNR) status at time of or within 24 hours of hospital admission, and LOS. Because the CA SID contains deidentified information, the Baystate Medical Center Institutional Review Board determined that the project did not meet the criteria for human subjects research.

We included one random admission (using the VisitLink variable on CA SID, and admission was selected randomly using the RANUNI function and seed on SAS 9.3 [SAS Institute Inc.]) of patients aged ≥18 years with metastatic cancer who received CCTs. One admission was selected to exclude patients admitted multiple times. In addition, random selection, instead of the first or last admission, was performed to ensure that patients had equal probability of experiencing the outcome (eg, mortality). CCTs were defined based on the following ICD-9-CM procedure codes: IMV, 96.70–96.72; percutaneous endoscopic gastrostomy (PEG) tube, 43.11; dialysis for acute kidney failure, both 584.5–585.9 and 39.95 to exclude patients on chronic dialysis; total parenteral nutrition (TPN), 99.15; and tracheostomy, 31.1, 31.21, 31.29. The ICD-9 codes to identify patients with metastatic cancer have been described previously.[12,13] We studied the use of these specific CCTs because they are more commonly used, are measures that typically require consent from patients or their healthcare proxies and are therefore considered more invasive than others, and are reliably coded.

Patient and Clinical Characteristics

We collected demographics including age, sex, race, insurance provider, comorbidities (modified combined comorbidity score derived from the Elixhauser and Charlson comorbidity index), cancer subtype, DNR status, principal diagnosis, teaching hospital status, and hospital bed count.[14] The CA SID determined that DNR status was present if it was written at or within 24 hours of hospital admission. We classified principal diagnosis using the Clinical Classifications Software, a tool developed by AHRQ that collapses ICD-9 codes. These diagnoses were further collapsed into various categories (cancer-related diagnoses, infections, other pulmonary disorders, other cardiovascular and circulation disorders, other neurologic disorders, other gastrointestinal disorders, fluid and electrolyte/renal disorders, and others) by the investigators. Teaching hospital status was determined after merging the American Hospital Association Annual Survey, and hospital bed count was classified as small (<200), medium (200–399), or large (≥400).

Measures

Use of IPC services was defined using the ICD-9 diagnosis code V66.7.[15,16] Two prior validation studies showed that it has a sensitivity of 66.3% to 83% and specificity of 95% to 99.1%.[15,16] We assessed several outcomes, including inpatient mortality, LOS, discharge destination, and cost of care in those who did and did not receive IPC services. The CA SID contains hospital charges calculated by hospital accounting systems (excluded hospital-based physician fees) from the index hospitalization, and the HCUP hospital-specific cost-to-charge ratios were used to convert charges to costs.[17]

Analyses

Patient characteristics and outcomes were described using the following descriptive analyses: counts and percentages, means, medians, and standard deviations (SD). We also described characteristics and outcomes of patients who did and did not receive IPC services (chi-square tests for categorical variables and Wilcoxon rank sum tests for continuous variables). Given the higher mortality associated with IMV use, separate analyses were performed for the subgroup of patients who received this intervention. Use of IPC services and outcomes were also described within strata defined by 4 of the most common cancer subtypes (lung, breast, colorectal, and genitourinary). For these subgroups, we adjusted for multiple comparisons using a Bonferroni correction, and tests were considered significant if $P<.0125$. Multivariable logistic regressions with generalized estimating equations accounting for hospital clustering effect were used to examine factors (age, sex, race, insurance provider, comorbidities, cancer subtype, DNR status, principal diagnosis, teaching hospital status, and hospital bed count) associated with the use of IPC services in the CCT and IMV groups. All analyses were performed using SAS 9.4 (SAS Institute Inc.).

Results

CCT Group Characteristics and Outcomes

A total of 5,862 admissions involving the administration of CCTs were included (Table 1). Mean patient age was 66.4 years (SD, 13.5), 50.2% were men, and 58.5% were white. Commonly used CCTs included IMV (51.8%), TPN (37.5%), PEG tube (14.1%), tracheostomy (8.4%), and dialysis for acute kidney failure (8.1%). Among cancer diagnoses, lung was the most common (14.1%), followed by colorectal (13.9%) and genitourinary (7.6%; prostate: 3.9%, bladder: 1.8%, kidney: 1.8%, other: 0.1%); Figure 1 shows the use of the various therapies across the cancer subtypes. DNR status at time of or within 24 hours of hospital admission was documented in 14.2% of patients. Approximately 30% of admissions were in hospitals with ≥400 beds. In-hospital mortality was 36.5%, mean LOS was 15.8 days (SD, 14.7), 66.4% of survivors were discharged to home, and mean cost of care among survivors was $51,397 (SD, $44,684).

Use of IPC Services

In the full cohort of patients hospitalized with meta-static cancer who received CCTs, 19.8% received IPC services (Figure 2) compared with 23.4% of patients in the IMV subgroup.

Characteristics and Outcomes of the CCT Group by IPC Use

No significant demographic differences were noted in patients who received IPC services compared with those who did not (Table 1). Compared with patients who did not use IPC services, those who did were more likely to have lung cancer (20.2% vs 12.6%; $P<.01$), higher mean comorbidity scores (2.1 vs 2.0; $P<.01$), and documented DNR status at time of admission or within 24 hours (24.7% vs 11.7%; $P<.01$), and to be admitted to hospitals with higher bed count (≥400 beds: 32.9% vs 29.4%; $P<.01$). Inhospital mortality was high in both those who received IPC services and those who did not (63.9% vs 29.8%; $P<.01$). Among survivors, LOS (14.3 vs 16.0 days; $P=.01$) and cost of care ($42,775 vs $52,387; $P<.01$)

were lower in those who received IPC services. Discharge destinations were not statistically significant between the 2 groups.

Characteristics and Outcomes of the IMV Subgroup by IPC Use

In patients receiving IMV, those who used IPC services were more likely to be white (59.7% vs 54.4%; P=.05), have documented DNR status at time of admission or within 24 hours (23.6% vs 13.1%; P<.01), and to be admitted to hospitals with higher bed count (≥400 beds: 35.5% vs 28.3%; P<.01) compared with those who did not receive IPC services (Table 2). In-hospital mortality in patients who received and did not receive IPC services was 82.0% and 49.7%, respectively. Among survivors, LOS, discharge destination, and cost of care were not statistically significant between the 2 groups.

Use of IPC Services Across Cancer Subtypes

In the CCT group, patients who received IPC services differed slightly across cancer subtypes (lung, 28.3%; breast, 22.4%; colorectal, 12.8%; and genitourinary, 16.1%; P<.01) (Figure 2). In the IMV group, a similar trend was noted (lung, 29.4%; breast, 24.7%; colorectal, 15.1%; and genitourinary, 19.5%; P<.01).

Characteristics and Outcomes Across Cancer Subtypes by IPC Use

In the CCT group, no demographic differences were noted in patients who received IPC services com pared with those who did not across all cancer sub-types (Table 3). Among patients with lung, colorectal, or genitourinary cancers, those who used IPC services were more likely to have documented DNR status at time of admission or within 24 hours (lung, 24.8% vs 16.4%; P<.01; colorectal, 24.0% vs 9.7%; P<.01; and genitourinary, 25.0% vs 10.6%; P<.01) compared with those who did not use IPC services (Table 3). In-hospital mortality was high in patients who received IPC services (range, 51.0%–75.0%) and in those who did not receive IPC services across all the examined cancer subtypes (range, 17.6%–49.3%). Patients with breast cancer who survived and received IPC services had lower cost of care ($26,530 vs $60,861; P<.01) compared with those who did not receive IPC services. In the IMV group, in-hospital mortality was similarly high in patients who received IPC services (range, 77.6%–86.3%) and in those who did not receive IPC services (range, 38.2%–59.7%) across all examined cancer subtypes (Table 4).

Factors Associated With IPC Use

In the CCT group, factors associated with IPC use included documented DNR status at time of admission or within 24 hours (adjusted odds ratio [AOR], 2.32; 95% CI, 1.92–2.71), cancer subtype (colorectal vs lung [ref]: AOR, 0.45; 95% CI, 0.33–0.56; genitourinary vs lung [ref]: AOR, 0.55; 95% CI, 0.38–0.71), higher comorbidity score (1 vs ≤0 [ref]: AOR, 1.25; 95% CI, 1.00–1.50; ≤0 [ref] vs ≥2: AOR, 1.41; 95% CI, 1.15–1.66), infections (vs cancer-related diagnoses [ref]: AOR, 1.25; 95% CI, 1.03–1.48), and higher bed count (large vs small [ref]: AOR, 1.63; 95% CI, 1.09–2.16; medium vs small [ref]: AOR, 1.56; 95% CI, 1.15–1.97) (Table 5). Factors associated with IPC use were similar in the IMV group.

Discussion

In this retrospective observational cohort of >5,500 critically ill hospitalized patients with metastatic cancer, we found that only 20% used IPC services. In-hospital mortality was much higher in those who received IPC services. In survivors, the LOS and cost of care were lower in those who received IPC services compared with those who did not. Although use of IPC services varied across cancer subtypes, it was more frequent in lung cancer (28.3%), followed by breast (22.4%), colorectal (12.8%), and genitourinary (16.1%), but it remained low overall. The differential use of IPC may be due to prior studies demonstrating benefits of palliative care services for patients with lung cancer.[7] We also identified several factors associated with IPC use, including documented DNR status at time of admission or within 24 hours, lung cancer, higher comorbidity, hospital admission with infections, and admission to hospitals with a higher bed count.

Given the retrospective design of the study, the higher in-hospital mortality rate in patients who received IPC services does not indicate a causal relationship between IPC use and mortality given the difficulty in adjusting for all potential confounders. Rather, it suggests that IPC services were provided to those whom clinicians perceived were likely to die and those who were sicker. Despite this, at least a quarter of patients who received CCTs died without receiving any IPC services. These findings suggest a clear opportunity to improve care for this vulnerable population. Earlier incorporation of IPC services may help in assessing patient preferences for life-prolonging treatment at the end of life and in redirecting care to fit patient preferences.

In our cohort, LOS and cost of care were also lower in the group that had received IPC services. When we evaluated outcomes based on IPC use in the various cancer subtypes, only patients with breast cancer who survived had statistically lower cost of care compared with other cancer subtypes. It is worth noting that patients with lung and genitourinary cancers who received IPC services also had lower cost of care, but these were not statistically significant likely due to the same population size. In terms of place of death, Paris and Morrison[18] demonstrated that IPC services led to a significant reduction in the odds of dying in a hospital for patients with advanced gastrointestinal cancers. A similar proportion of patients were discharged to home in our study, but we are unable to determine which of these patients were discharged home on hospice, because the CA SID does not include these data. Early IPC interventions implemented prospectively in the ICU have also been shown to result in a more frequent change of code status to DNR and increased rate of hospice referral, as well as significant reduction in LOS and cost of care.[19]

Prior studies have shown a discrepancy between patient preference for end-of-life care and the reality of practice.[20,21] Most patients who are terminally ill from cancer report a preference to die at home, yet many of them receive CCTs, and many end up dying in the hospital.[22] It is possible that this disparity could be reduced by increased use of outpatient and/or inpatient palliative care and hospice services, although this needs to be further investigated.[18] Professional organizations such as ASCO recommend that patients with metastatic disease have palliative care services integrated early in their treatment course and throughout their illness[23]; the impact on the quality of end-of-life care has been shown to be

greater when palliative services are initiated earlier, specifically in the outpatient setting.[9,24] However, data on how the timing of palliative care affects quality and costs remain limited. Still, IPC services can complement the care of these patients when admitted to the hospital, because preferences for endof-life care often change. For example, in patients on chronic dialysis (not specific to cancer), 45% had their care changed from aggressive to palliative when they were admitted to a hospital.[25]

Our study has several limitations. First, we only included specific CCTs and our findings therefore do not apply to other types of therapies, such as jejunostomy or vasopressors. Second, information on socioeconomic status (eg, marital status, education, ZIP code) is not available in the CA SID. Third, we were unable to measure the use of outpatient palliative care services because this variable was not captured in the CA SID. Hospice information was also not available in the CA SID, and therefore we were unable to comment on patients who were discharged to hospice. Fourth, this study is limited by a lack of information on mortality after discharge. We also do not have data on the date of IPC service use. Fifth, IPC service use was determined based on ICD-9 codes, specifically a V code, and may underestimate the actual use of IPC services. Therefore, we may not have captured some patients who received IPC services, but when the ICD-9 code V66.7 was identified, the patient most likely received IPC services. It should be noted that although the presence of ICD-9 code V66.7 indicated involvement of IPC services, the nature of this involvement was unclear (eg, palliative care consult, admission to the palliative care units or reasons for involvement). Although this code may not have been used each time IPC services were involved, the use pattern of this code would theoretically be consistent across cancer subtypes. Sixth, we could not determine the number of hospitals with IPC services, the IPC team structure, and their capacity to see patients. Seventh, the CA SID defined DNR status as present if this was documented at time of admission or within 24 hours. It is possible that IPC service was involved in the first 24 hours of admission, which may explain why more patients who received IPC services had DNR status documented more frequently. Lastly, it is unclear if the information on charges available from the CA SID was comprehensive of all services provided in the hospital.

Conclusions

Use of IPC services was low in this cohort of patients with metastatic cancer who received CCTs despite poor prognosis and high in-hospital mortality. More studies are needed to understand motivators behind the use of IPC services (eg, whether clinicians tend to use IPC in patients with predicted poorer short-term outcomes) and to assess the impact early IPC use can have on patient care.

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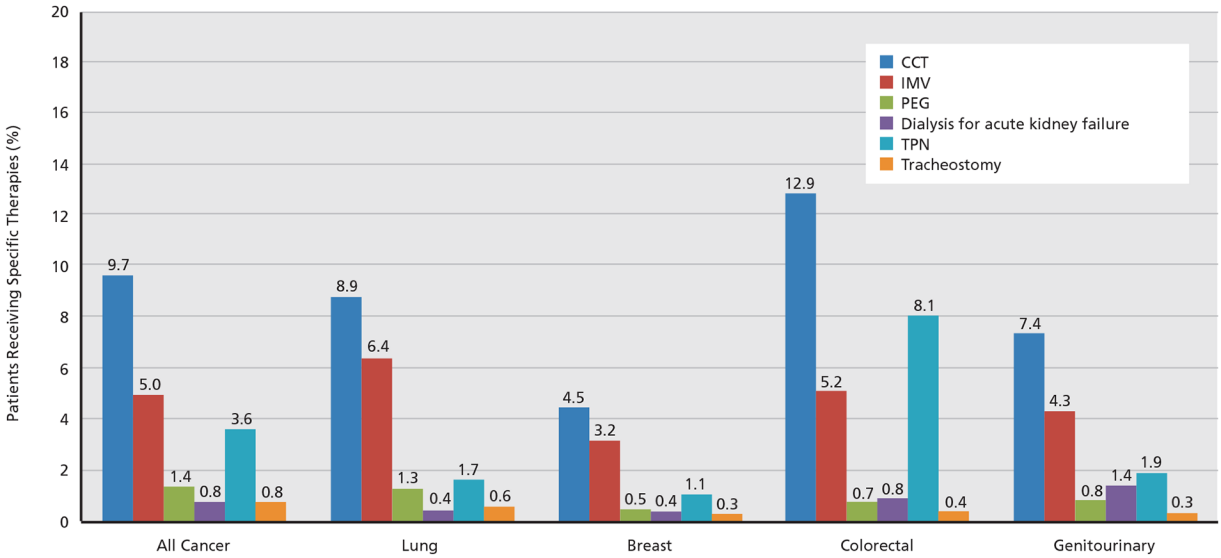

Figure 1.

Comparison of various CCTs across cancer subtypes (all $P<.01$). The denominator is the number of admissions with metastatic cancer (n=60,507). Abbreviations: CCT, critical care therapies; IMV, invasive mechanical ventilation; PEG, percutaneous endoscopic gastrostomy; TPN, total parenteral nutrition.

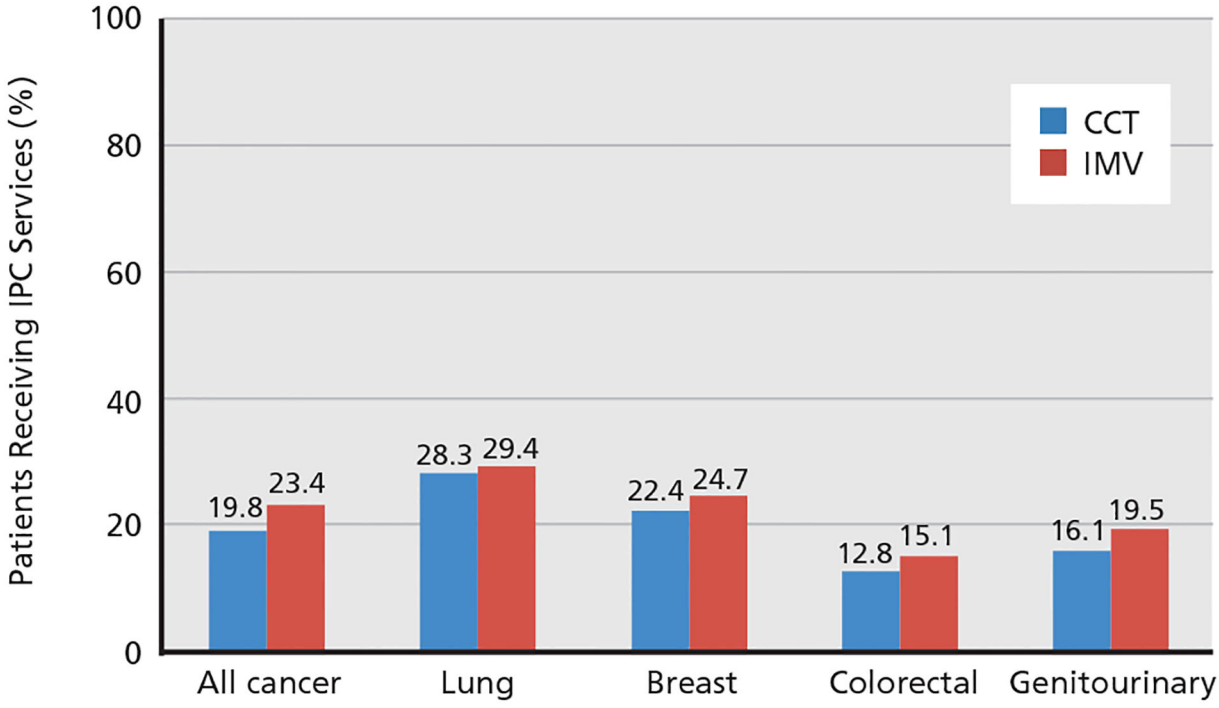

Figure 2.

Comparison of inpatient palliative care (IPC) services across cancer sub-types (all $P<.01$). The denominator is the number of patients who received critical care therapies (CCT; n=5,862) and invasive mechanical ventilation (IMV; n=3,035).

Table 1.

Outcomes and Demographic and Clinical Characteristics of Patients on CCTs

Characteristics	All Admissions (N=5,862)	IPC (N=1,158)	No IPC (N=4,704)	*P* Value
Age, n (%)				.87
<55 y	1,073 (18.3%)	210 (18.1%)	863 (18.3%)	
55–64 y	1,400 (23.9%)	287 (24.8%)	1,113 (23.7%)	
65–74 y	1,605 (27.4%)	310 (26.8%)	1,295 (27.5%)	
≥75 y	1,784 (30.4%)	351 (30.3%)	1,433 (30.5%)	
Male sex, n (%)[a]	2,944 (50.2%)	573 (49.5%)	2,371 (50.4%)	.73
Race, n (%)				.18
White	3,432 (58.5%)	692 (59.8%)	2,740 (58.2%)	
Black	536 (9.1%)	106 (9.1%)	430 (9.1%)	
Hispanic	928 (15.8%)	173 (14.9%)	755 (16.1%)	
Other[b]	728 (12.4%)	153 (13.2%)	575 (12.2%)	
Missing	238 (4.1%)	34 (2.9%)	204 (4.3%)	
Insurance provider, n (%)				.26
Medicare	3,282 (56.0%)	648 (56.0%)	2,634 (56.0%)	
Medicaid	742 (12.7%)	135 (11.7%)	607 (12.9%)	
Private	1,647 (28.1%)	336 (29.0%)	1,311 (27.9%)	
No charge/other	87 (1.5%)	23 (2.0%)	64 (1.4%)	
Self–pay	104 (1.8%)	16 (1.4%)	88 (1.9%)	
Mean comorbidity score (SD)	2.0 (2.0)	2.1 (1.8)	2.0 (2.0)	<.01
DNR, n (%)				<.01
Yes	835 (14.2%)	286 (24.7%)	549 (11.7%)	
No	5,025 (85.7%)	872 (75.3%)	4,153 (88.3%)	
Missing	2 (0.1%)	0 (0%)	2 (0%)	
Cancer subtype, n (%)				<.01
Lung	826 (14.1%)	234 (20.2%)	592 (12.6%)	
Breast	268 (4.6%)	60 (5.2%)	208 (4.4%)	

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Characteristics	All Admissions (N=5,862)	IPC (N=1,158)	No IPC (N=4,704)	*P* Value
Colorectal	813 (13.9%)	104 (9.0%)	709 (15.1%)	
Genitourinary	448 (7.6%)	72 (6.2%)	376 (8.0%)	
Other cancer or >1 subtype	2,163 (36.9%)	402 (34.7%)	1,761 (37.4%)	
Not identified	1,344 (22.9%)	286 (24.7%)	1,058 (22.5%)	
Principal diagnosis, n (%)				<.01
Cancer–related disorders	2,841 (48.5%)	514 (44.4%)	2,327 (49.5%)	
Infections	1,135 (19.4%)	277 (23.9%)	858 (18.2%)	
Other pulmonary disorders	511 (8.7%)	122 (10.5%)	389 (8.3%)	
Other cardiovascular and circulation disorders	239 (4.1%)	47 (4.1%)	192 (4.1%)	
Other neurologic disorders	72 (1.2%)	15 (1.3%)	57 (1.2%)	
Other gastrointestinal disorders	512 (8.7%)	91 (7.9%)	421 (9.0%)	
Fluid and electrolyte/renal disorders	209 (3.6%)	41 (3.5%)	168 (3.6%)	
Others	343 (5.9%)	51 (4.4%)	292 (6.2%)	
Teaching hospital, n (%)[c]	2,696 (46.0%)	513 (44.3%)	2,183 (46.4%)	.02
Hospital bed count, n (%)				<.01
Small (<200)	1,511 (25.8%)	228 (19.7%)	1,283 (27.3%)	
Medium (200–399)	2,520 (43.0%)	527 (45.5%)	1,993 (42.4%)	
Large (>400)	1,763 (30.1%)	381 (32.9%)	1,382 (29.4%)	
Missing	68 (1.2%)	22 (1.9%)	46 (1.0%)	
In–hospital mortality, n (%)	2,140 (36.5%)	740 (63.9%)	1,400 (29.8%)	<.01
Discharge among survivors, n (%)				.07
Home, home healthcare	2,473 (66.4%)	282 (67.5%)	2,191 (66.3%)	
SNF.ICF, or facility	970 (26.1%)	95 (22.7%)	875 (26.5%)	
Short–term hospital, AMA, or other	279 (7.5%)	41 (9.8%)	238 (7.2%)	
Mean cost of care among survivors (SD)[d]	$51,397 ($44,684)	$42,775 ($40,136)	$52,387 ($45,078)	<.01
Mean length of stay among survivors (SD), d[a]	15.8 (14.7)	14.3 (13.3)	16.0 (14.9)	.01

Abbreviations: AMA, against medical advice; CCTs, critical care therapies; DNR, do not resuscitate; ICF, intermediate care facility; IPC, inpatient palliative care services; SNF, skilled nursing facility.

[a]8 missing.

[b] Includes Asian or Pacific Islander, Native American, or other as coded on the California State Inpatient Database.

[c] 68 missing.

[d] 584 missing.

Table 2.

Outcomes and Demographic and Clinical Characteristics of Patients on IMV

Characteristics	All Admissions (N=3,035)	IPC (N=709)	No IPC (N=2,326)	*P* Value
Age, n (%)				.08
<55 y	537 (17.7%)	134 (18.9%)	403 (17.3%)	
55–64 y	716 (23.6%)	187 (26.4%)	529 (22.7%)	
65–74 y	864 (28.5%)	183 (25.8%)	681 (29.3%)	
≥75 y	918 (30.3%)	205 (28.9%)	713 (30.7%)	
Male sex, n (%)[a]	1,544 (50.9%)	364 (51.3%)	1,180 (50.7%)	.90
Race, n (%)				.05
White	1,689 (55.7%)	423 (59.7%)	1,266 (54.4%)	
Black	313 (10.3%)	59 (8.3%)	254 (10.9%)	
Hispanic	497 (16.4%)	105 (14.8%)	392 (16.9%)	
Other[b]	395 (13.0%)	96 (13.5%)	299 (12.9%)	
Missing	141 (4.6%)	26 (3.7%)	115 (4.9%)	
Insurance provider, n (%)				.07
Medicare	1,731 (57.0%)	378 (53.3%)	1,353 (58.2%)	
Medicaid	412 (13.6%)	97 (13.7%)	315 (13.5%)	
Private	780 (25.7%)	204 (28.8%)	576 (24.8%)	
No charge/other	51 (1.7%)	17 (2.4%)	34 (1.5%)	
Self–pay	61 (2.0%)	13 (1.8%)	48 (2.1%)	
Mean comorbidity score (SD)	2.3 (2)	2.3 (1.9)	2.3 (2)	.47
DNR, n (%)				<.01
Yes	471 (15.5%)	167 (23.6%)	304 (13.1%)	
No	2,563 (84.5%)	542 (76.4%)	2,021 (86.9%)	
Missing	1 (0%)	0 (0%)	1 (0%)	
Cancer subtype, n (%)				<01
Lung	598 (19.7%)	176 (24.8%)	422 (18.1%)	
Breast	190 (6.3%)	47 (6.6%)	143 (6.2%)	

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Characteristics	All Admissions (N=3,035)	IPC (N=709)	No IPC (N=2,326)	*P* Value
Colorectal	324 (10.7%)	49 (6.9%)	275 (11.8%)	
Genitourinary	262 (8.6%)	51 (7.2%)	211 (9.1%)	
Other cancer or > 1 subtype	905 (29.8%)	205 (28.9%)	700 (30.1%)	
Not identified	756 (24.9%)	181 (25.5%)	575 (24.7%)	
Principal diagnosis, n (%)				.22
Cancer–related disorders	1,191 (39.2%)	264 (37.2%)	927 (39.9%)	
Infections	887 (29.2%)	227 (32.0%)	660 (28.4%)	
Other pulmonary disorders	434 (14.3%)	111 (15.7%)	323 (13.9%)	
Other cardiovascular and circulation disorders	166 (5.5%)	30 (4.2%)	136 (5.9%)	
Other neurologic disorders	46 (1.5%)	11 (1.6%)	35 (1.5%)	
Other gastrointestinal disorders	131 (4.3%)	27 (3.8%)	104 (4.5%)	
Fluid and electrolyte/renal disorders	34 (1.1%)	10 (1.4%)	24 (1.0%)	
Others	146 (4.8%)	29 (4.1%)	117 (5.0%)	
Teaching hospital, n (%)[c]	1,346 (44.3%)	325 (45.8%)	1,021 (43.9%)	.19
Hospital bed count, n (%)				<01
Small (<200)	810 (26.7%)	140 (19.8%)	670 (28.8%)	
Medium (200–399)	1,283 (42.3%)	306 (43.2%)	977 (42.0%)	
Large (≥400)	910 (30.0%)	252 (35.5%)	658 (28.3%)	
Missing	32 (1.0%)	11 (1.5%)	21 (0.9%)	
In–hospital mortality, n (%)	1,736 (57.2%)	581 (82.0%)	1,155 (49.7%)	<.01
Discharge among survivors, n (%)				.41
Home, home healthcare	697 (53.7%)	72 (56.3%)	625 (53.4%)	
SNF, ICF, or facility	449 (34.6%)	38 (29.7%)	411 (35.1 %)	
Short–term hospital, AMA, or other	153 (11.8%)	18 (14.1%)	135 (11.5%)	
Median cost of care among survivors (SD)[d]	$67,330 ($54,204)	$59,319 ($47,859)	$68,132 ($54,757)	.09
Mean length of stay among survivors (SD), d[e]	18.2 (18.5)	15.6 (12.9)	18.5 (19.0)	.14

Abbreviations: AMA, against medical advice; DNR, do not resuscitate; ICF, intermediate care facility; IMV, invasive mechanical ventilation; IPC, inpatient palliative care services; SNF, skilled nursing facility.

[a] 6 missing.

[b]includes Asian or Pacific Islander, Native American, or other as coded on the California State Inpatient Database.

[c]32 missing.

[d]189 missing.

[e]1 missing.

Table 3.

Demographics, Clinical Characteristics, and Outcomes of Patients on CCTs Across Cancer Subtypes

	Lung (N=826)			Breast (N=268)			Colorectal (N=813)			Genitourinary (N=448)		
Characteristics	**IPC (n=234)**	**No IPC (n=592)**	***P* Value**	**IPC (n=60)**	**No IPC (n=208)**	***P* Value**	**IPC (n=104)**	**No IPC (n=709)**	***P* Value**	**IPC (n=72)**	**No IPC (n=376)**	***P* Value**
Age, n (%)			.38			.04			.94			.39
<55 y	32 (13.7%)	77 (13.0%)		18 (30.0%)	58 (27.9%)		19 (18.3%)	126 (17.8%)		11 (15.3%)	35 (9.3%)	
55–64 y	65 (27.8%)	147 (24.8%)		16 (26.7%)	47 (22.6%)		21 (20.2%)	152 (21.4%)		10 (13.9%)	67 (17.8%)	
65–74 y	88 (37.6%)	210 (35.5%)		7 (11.7%)	60 (28.9%)		25 (24.0%)	153 (21.6%)		16 (22.2%)	98 (26.1%)	
≥75 y	49 (20.9%)	158 (26.7%)		19 (31.7%)	43 (20.7%)		39 (37.5%)	278 (39.2%)		35 (48.6%)	176 (46.8%)	
Male sex, n (%)	130 (55.6%)	318 (53.7%)	.61	0 (0%)	4 (1.9%)	.48	58 (55.8%)	392 (55.3%)	.93	58 (80.6%)	324 (86.2%)	.33
Race, n (%)			.68			.82			.57			.48
White	148 (63.3%)	350 (59.1%)		36 (60.0%)	114 (54.8%)		57 (54.8%)	423 (59.7%)		47 (65.3%)	205 (54.5%)	
Black	21 (9.0%)	56 (9.5%)		8 (13.3%)	23 (11.1%)		11 (10.6%)	66 (9.3%)		7 (9.7%)	49 (13%)	
Hispanic	25 (10.7%)	64 (10.8%)		9 (15.0%)	42 (20.2%)		19 (18.3%)	109 (15.4%)		9 (12.5%)	74 (19.7%)	
Other[a]	32 (13.7%)	89 (15.0%)		6 (10.0%)	22 (10.6%)		14 (13.5%)	73 (10.3%)		6 (8.3%)	32 (8.5%)	
Missing	8 (3.4%)	33 (5.6%)		1 (1.7%)	7 (3.4%)		3 (2.9%)	38 (5.4%)		3 (4.2%)	16 (4.3%)	
Insurance provider, n (%)			.18			.84			.70			.74
Medicare	128 (54.7%)	365 (61.7%)		30 (50.0%)	105 (50.5%)		67 (64.4%)	419 (59.1%)		46 (63.9%)	254 (67.6%)	
Medicaid	29 (12.4%)	72 (12.2%)		9 (15.0%)	37 (17.8%)		9 (8.7%)	87 (12.3%)		9 (12.5%)	41 (10.9%)	
Private	67 (28.6%)	134 (22.6%)		19 (31.7%)	62 (29.8%)		23 (22.1%)	178 (25.1%)		15 (20.8%)	75 (20.0%)	
No charge/other	7 (3.0%)	9 (1.5%)		2 (3.3%)	3 (1.4%)		3 (2.9%)	14 (2.0%)		1 (1.4%)	1 (0.3%)	
Self–pay	3 (1.3%)	12 (2.0%)		0 (0%)	1 (0.5%)		2 (1.9%)	11 (1.6%)		1 (1.4%)	5 (1.3%)	
Mean comorbidity score (SD)	2.3 (1.9)	2.4 (1.9)	.67	2.2 (1.8)	2.1 (2.0)	.73	2.2 (2.0)	2.0 (1.9)	.45	13.5 (12.1)	15.0 (16.5)	.38
DNR, n (%)			<.01[b]			.07			<.01[b]			<.01[b]
Yes	58 (24.8%)	97 (16.4%)		16 (26.7%)	34 (16.4%)		25 (24.0%)	69 (9.7%)		18 (25.0%)	40 (10.6%)	
No	176 (75.2%)	495 (83.6%)		44 (73.3%)	174 (83.7%)		79 (76.0%)	639 (90.1%)		54 (75.0%)	336 (89.4%)	
Missing	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	1 (0.1%)		0 (0%)	0 (0%)	
Principal diagnosis, n (%)			.20			.49			<.01[b]			.75
Cancer–related disorders	96 (41.0%)	213 (36.0%)		17 (28.3%)	50 (24.0%)		54 (51.9%)	460 (64.9%)		19 (26.4%)	136 (36.2%)	
Infections	60 (25.6%)	150 (25.3%)		22 (36.7%)	61 (29.3%)		27 (26.0%)	86 (12.1%)		24 (33.3%)	103 (27.4%)	
Other pulmonary disorders	44 (18.8%)	98 (16.6%)		5 (8.3%)	27 (13.0%)		5 (4.8%)	15 (2.1%)		6 (8.3%)	38 (10.1%)	

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Characteristics	Lung (N=826)			Breast (N=268)			Colorectal (N=813)			Genitourinary (N=448)		
	IPC (n=234)	No IPC (n=592)	*P* Value	IPC (n=60)	No IPC (n=208)	*P* Value	IPC (n=104)	No IPC (n=709)	*P* Value	IPC (n=72)	No IPC (n=376)	*P* Value
Other cardiovascular and circulation disorders	8 (3.4%)	34 (5.7%)		2 (3.3%)	11 (5.3%)		3 (2.9%)	20 (2.8%)		5 (6.9%)	23 (6.1%)	
Other neurologic disorders	4 (1.7%)	9 (1.5%)		2 (3.3%)	8 (3.9%)		2 (1.9%)	7 (1.0%)		0 (0%)	3 (0.8%)	
Other gastrointestinal disorders	13 (5.6%)	38 (6.4%)		2 (3.3%)	21 (10.1%)		8 (7.7%)	67 (9.5%)		8 (11.1%)	30 (8.0%)	
Fluid and electrolyte/renal disorders	5 (2.1%)	16 (2.7%)		5 (8.3%)	9 (4.3%)		2 (1.9%)	15 (2.1%)		6 (8.3%)	27 (7.2%)	
Others	4 (1.7%)	34 (5.7%)		5 (8.3%)	21 (10.1%)		3 (2.9%)	39 (5.5%)		4 (5.6%)	16 (4.3%)	
Teaching hospital, n (%)	88 (37.6%)	240 (40.5%)	.50	27 (45.0%)	89 (42.8%)	.86	40 (38.5%)	288 (40.6%)	.66	32 (44.4%)	172 (45.7%)	.98
Hospital bed count, n (%)			<.01[b]				.43		.61			.09
Small (<200)	47 (20.1%)	186 (31.4%)		11 (18.3%)	60 (28.9%)		33 (31.7%)	213 (30.0%)		15 (20.8%)	113 (30.1%)	
Medium (200–399)	110 (47.0%)	255 (43.1%)		31 (51.7%)	91 (43.8%)		39 (37.5%)	306 (43.2%)		26 (36.1%)	156 (41.5%)	
Large (2400)	76 (32.5%)	145 (24.5%)		16 (26.7%)	52 (25.0%)		30 (28.9%)	183 (25.8%)		30 (41.7%)	102 (27.1%)	
In–hospital mortality, n (%)	169 (72.2%)	292 (49.3%)	<.01[b]	45 (75.0%)	94 (45.2%)	<.01[b]	53 (51.0%)	125 (17.6%)	<.01[b]	46 (63.9%)	135 (35.9%)	<.01[b]
Discharge among survivors, n (%)			.25			.84			.50			.10
Home, home healthcare	43 (66.2%)	170 (56.7%)		10 (66.7%)	68 (59.7%)		36 (70.6%)	388 (66.4%)		15 (57.7%)	140 (58.1%)	
SNF.ICF, or facility	8 (12.3%)	34 (11.3%)		1 (6.7%)	7 (6.1%)		5 (9.8%)	42 (7.2%)		5 (19.2%)	18 (7.5%)	
Short–term hospital, AMA, or other	14 (21.5%)	96 (32.0%)		4 (26.7%)	39 (34.2%)		10 (19.6%)	154 (26.4%)		6 (23.1%)	83 (34.4%)	
Median cost of care among survivors (SD)	$42,077 ($35,359)	$48,903 ($46,236)	.42	$26,530 ($23,415)	$60,861 ($60,463)	<.01[b]	$48,196 ($34,900)	$54,840 ($43,776)	.37	$54,569 ($44,188)	$52,291 ($40,549)	.99
Mean length of stay among survivors (SD), d	13.6 (11.9)	15.2 (17.0)	.83	8.9 (6.9)	17.9 (16.0)	.02	16.0 (11.8)	17.0 (11.9)	.59	16.4 (12.7)	15.5 (10.6)	.75

Abbreviations: AMA, against medical advice; CCT, critical care therapies; DNR, do not resuscitate; ICF, intermediate care facility; IPC, inpatient palliative care services; SNF, skilled nursing facility.

[a] Includes Asian or Pacific Islander, Native American, or other as coded on the California State Inpatient Database.

[b] Tests were considered significant if $P<.0125$ after adjusting for multiple comparisons.

Table 4.

Demographics, Clinical Characteristics, and Outcomes of Patients on IMV Across Cancer Subtypes

	Lung (N=5!)S)			Breast (N=190)			Colorectal (N=324)			Genitourinary (N=262)		
Characteristics	**IPC (n=176)**	**No IPC (n=422)**	***P* Value**	**IPC (n=47)**	**No IPC (n=143)**	***P* Value**	**IPC (n=49)**	**No IPC (n=275)**	***P* Value**	**IPC (n=51)**	**No IPC (n=211)**	***P* Value**
Age, n (%)			.64			.10			.36			.33
<55y	23 (13.1%)	59 (14.0%)		16 (34.0%)	44 (30.8%)		8 (16.3%)	43 (15.6%)		9 (17.7%)	19 (9.0%)	
55–64y	49 (27.8%)	106 (25.1%)		14 (29.8%)	34 (23.8%)		14 (28.6%)	50 (18.2%)		9 (17.7%)	35 (16.6%)	
65–74 y	66 (37.5%)	147 (34.8%)		5 (10.6%)	40 (28.0 %)		9 (18.4%)	67 (24.4%)		11 (21.6%)	53 (25.1%)	
≥75y	38 (21.6%)	110 (26.1%)		12 (25.5%)	25 (17.5%)		18 (36.7%)	115 (41.8%)		22 (43.1 %)	104 (49.3%)	
Male sex, n (%)	98 (55.7%)	228 (54.0%)	.63	0 (0%)	3 (2.1%)	.51	30 (61.2%)	158 (57.5%)	.62	41 (80.4%)	186 (88.2%)	.26
Race, n (%)			.64			.65			.66			.43
White	114 (64.8%)	246 (58.3%)		27 (57.5%)	75 (52.5%)		24 (49.0%)	152 (55.3%)		33 (64.7%)	105 (49.8%)	
Black	14 (8.0%)	45 (10.7%)		8 (17.0%)	17 (11.9%)		3 (6.1 %)	28 (10.%)		5 (9.8%)	30 (14.2%)	
Hispanic	17 (9.7%)	47 (11.1%)		6 (12.8%)	28 (19.6%)		11 (22.5%)	46 (16.7%)		8 (15.7%)	42 (19.9%)	
Other[a]	24 (13.6%)	62 (14.7%)		5 (10.6%)	16 (11.2%)		8 (16.3%)	33 (12.0%)		3 (5.9%)	22 (10.4%)	
Missing	7 (4.0%)	22 (5.2%)		1 (2.1%)	7 (4.9%)		3 (6.1%)	16 (5.8%)		2 (3.9%)	12 (5.7%)	
Insurance provider, n (%)			.32			.57			.50			.64
Medicare	97 (55.1%)	262 (62.1%)		19 (40.4%)	68 (47.6%)		27 (55.1%)	170 (61.8%)		31 (60.8%)	144 (68.3%)	
Medicaid	22 (12.5%)	52 (12.3%)		8 (17.0%)	31 (21.7%)		6 (12.2%)	32 (11.6%)		8 (15.7%)	22 (10.4%)	
Private	50 (28.4%)	91 (21.6%)		18 (38.3%)	40 (28.0%)		12 (24.5%)	64 (23.3%)		10 (19.6%)	40 (19.0%)	
No charge/other	5 (2.8%)	8 (1.9%)		2 (4.3%)	3 (2.1%)		2 (4.1%)	3 (1.1%)		1 (2.0%)	1 (0.5%)	
Self–pay	2 (1.1%)	9 (2.1%)		0 (0%)	1 (0.7%)		2 (4.1%)	6 (2.2%)		1 (2.0%)	4 (1.9%)	
Mean comorbidity score (SD)	2.3 (1.8)	2.4 (1.9)	.79	2.3 (1.9)	2.2 (2.1)	.65	2.4 (2.2)	2.5 (2)	.49	2.9 (2)	2.9 (2.1)	.84
DNR, n (%)			.01[b]			.15			.03			.05
Yes	41 (23.3%)	63 (14.9%)		12 (25.5%)	23 (16.1%)		12 (24.5%)	30 (10.9%)		11 (21.6%)	24 (11.4%)	
No	135 (76.7%)	359 (85.1%)		35 (74.5%)	120 (83.9%)		37 (75.5%)	244 (88.7%)		40 (78.4%)	187 (88.6%)	
Missing	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	1 (0.4%)		0 (0%)	0 (0%)	
Principal diagnosis, n (%)			.21			.10			.23			.56
Cancer–related disorders	71 (40.3%)	151 (35.8%)		14 (29.8%)	31 (21.7%)		19 (38.8%)	148 (53.8%)		11 (21.6%)	55 (26.1 %)	
Infections	50 (28.4%)	121 (28.7%)		20 (42.6%)	53 (37.1%)		17 (34.7%)	65 (23.6%)		22 (43.1%)	78 (37.0%)	
Other pulmonary disorders	41 (23.3%)	87 (20.6%)		5 (10.6%)	24 (16.8%)		5 (10.2%)	15 (5.5%)		5 (9.8%)	35 (16.6%)	

Characteristics	Lung (N=5!)S)			Breast (N=190)			Colorectal (N=324)			Genitourinary (N=262)		
	IPC (n=176)	No IPC (n=422)	*P* Value	IPC (n=47)	No IPC (n=143)	*P* Value	IPC (n=49)	No IPC (n=275)	*P* Value	IPC (n=51)	No IPC (n=211)	*P* Value
Other cardiovascular and circulation disorders	2 (1.1%)	27 (6.4%)		1 (2.1%)	10 (7.0%)		3 (6.1%)	12 (4.4%)		3 (5.9%)	17 (8.1%)	
Other neurologic disorders	4 (2.3%)	7 (1.7%)		1 (2.1%)	5 (3.5%)		2 (4.1%)	3 (1.1%)		0 (0%)	1 (0.5%)	
Other gastrointestinal disorders	4 (2.3%)	12 (2.8%)		0 (0%)	8 (5.6%)		2 (4.1%)	18 (6.6%)		5 (9.8%)	13 (6.2%)	
Fluid and electrolyte/renal disorders	1 (0.6%)	4 (1.0%)		3 (6.4%)	1 (0.7%)		0 (0%)	1 (0.4%)		2 (3.9%)	2 (0.9%)	
Others	3 (1.7%)	13 (3.1%)		3 (6.4%)	11 (7.7%)		1 (2.0%)	13 (4.7%)		3 (5.9%)	10 (4.7%)	
Teaching hospital, n {%)	73 (41.5%)	175 (41.5%)	.90	24 (51.1%)	57 (39.9%)	.39	22 (44.9%)	106 (38.5%)	.56	23 (45.1 %)	91 (43.1 %)	.86
Hospital bed count, n (%)			.01[b]			.74			.11			<.01[b]
Small (<200)	37 (21.0%)	137 (32.5%)		10 (21.3%)	40 (28.0%)		13 (26.5%)	90 (32.7%)		10 (19.6%)	65 (30.8%)	
Medium (200–399)	78 (44.3%)	181 (42.9%)		24 (51.1%)	68 (47.6%)		16 (32.7%)	115 (41.8%)		17 (33.3%)	96 (45.5%)	
Large (>400)	60 (34.1%)	100 (23.7%)		12 (25.5%)	30 (21.0%)		20 (40.8%)	67 (24.4%)		24 (47.1%)	49 (23.2%)	
Missing	1 (0.6%)	4 (0.9%)		2 (2.1%)	5 (3.4%)		0 (0%)	3 (1.0%)		0 (0%)	1 (0.5%)	
In–hospital mortality, n (%)	144 (81.8%)	252 (59.7%)	<.01[b]	39 (83.0%)	85 (59.4%)	<.01[b]	38 (77.6%)	105 (38.2%)	<.01[b]	44 (86.3%)	112 (53.1%)	<.01[b]
Discharge among survivors, n (%)			.45			.98			.63			.06
Home, home healthcare	20 (62.5%)	89 (52.4%)		4 (50.0%)	29 (50.0%)		6 (54.6%)	86 (50.6%)		3 (42.9%)	45 (45.5%)	
SNF.ICF, or facility	5 (15.6%)	25 (14.7%)		1 (12.5%)	6 (10.3%)		2 (18.2%)	18 (10.6%)		3 (42.9%)	12 (12.1%)	
Short–term hospital, AMA, or other	7 (21.9%)	56 (32.9%)		3 (37.5%)	23 (39.7%)		3 (27.3%)	66 (38.8%)		1 (14.3%)	42 (42.4%)	
Mean cost of care among survivors (SD)	$51,040 ($40,801)	$58,839 ($46,218)	.33	$35,709 ($29,466)	$75,353 ($71,486)	.05	$74,061 ($45,663)	$76,487 ($56,100)	.80	$74,303 ($62,549)	$63,495 ($46,015)	.97
Mean length of stay among survivors (SD), d	16.0 (15.5)	16.7 (18.2)	.75	10.0 (7.1)	20.1 (18.6)	.14	16.6 (11.6)	20.1 (14.7)	.47	20.6 (19.1)	15.6 (10.5)	.70

Abbreviations: AMA, against medical advice; DNR, do not resuscitate; ICF, intermediate care facility; IMV, invasive mechanical ventilation; IPC, inpatient palliative care services; SNF, skilled nursing facility.

[a]Includes Asian or Pacific Islander, Native American, or other as coded on the California State Inpatient Database.

[b]Tests were considered significant if *P*<.0125 after adjusting for multiple comparisons.

Table 5.

Predictors of IPC Use

Variables	Adjusted Odd Ratios (95% CI)	
	CCTs	IMV
Age		
<55y	1 (Ref)	1 (Ref)
55–64 y	1.00 (0.79–1.21)	1.05 (0.77–1.32)
65–74 y	0.93 (0.70–1.16)	1.00 (0.69–1.31)
≥75 y	0.92 (0.69–1.16)	1.08 (0.73–1.42)
Sex		
Male	1 (Ref)	1 (Ref)
Female	0.97 (0.84–1.11)	0.93 (0.76–1.10)
Race		
White	1 (Ref)	1 (Ref)
Hispanic	1.02 (0.82–1.22)	0.94 (0.71–1.17)
Black	1.03 (0.77–1.29)	0.81 (0.56–1.07)
Other[a]	1.07 (0.85–0.29)	0.97 (0.71–1.22)
Insurance provider		
Medicare	1 (Ref)	1 (Ref)
Medicaid	0.91 (0.68–1.15)	1.17 (0.80–0.95)
Private	1.02 (0.81–1.24)	1.29 (9.05–1.63)
No charge/other	1.80 (0.86–2.74)	2.32 (0.84–3.80)
Self–pay	0.81 (0.35–1.27)	1.13 (0.41–1.85)
Comorbidity score		
≤0	1 (Ref)	1 (Ref)
1	1.25 (1.00–1.50)	1.18 (0.85–1.50)
≥2	1.41 (1.15–1.66)	1.40 (1.05–1.74)
DNR		
No	1 (Ref)	1 (Ref)
Yes	2.32 (1.92–2.71)	1.97 (1.54–2.41)
Cancer subtype		
Lung	1 (Ref)	1 (Ref)
Not identified	0.70 (0.55–0.84)	0.71 (0.53–0.89)
Breast	0.77 (0.51–1.04)	0.96 (0.59–1.33)
Colorectal	0.45 (0.33–0.56)	0.51 (0.33–0.68)
Genitourinary	0.55 (0.38–0.71)	0.67 (0.43–0.91)
Other cancer or >2 subtypes	0.66 (0.53–0.79)	0.76 (0.57–0.94)
Principal diagnosis		
Cancer–related disorders	1 (Ref)	1 (Ref)

Variables	Adjusted Odd Ratios (95% CI)	
	CCTs	IMV
Infections	1.25 (1.03–1.48)	1.19 (0.93–1.45)
Other pulmonary disorders	1.14 (0.87–1.42)	1.12 (0.81–1.42)
Other cardiovascular and circulation disorders	0.98 (0.64–1.32)	0.80 (0.46–1.13)
Other neurologic and psychiatric disorders	0.95 (0.37–1.53)	0.88 (0.25–1.51)
Other gastrointestinal disorders	0.91 (0.68–1.14)	0.90 (0.49–1.32)
Fluid and electrolyte/renal disorders	1.02 (0.65–1.39)	1.70 (0.44–2.97)
Others	0.76 (0.52–1.00)	0.90 (0.49–1.32)
Not a teaching hospital	1.02 (0.77–1.27)	1.08 (0.74–1.42)
Hospital bed count		
Small (<200)	1 (Ref)	1 (Ref)
Medium (200–399)	1.56 (1.15–1.97)	1.69 (1.11–2.27)
Large (>400)	1.63 (1.09–2.16)	1.83 (1.04–2.62)

Abbreviations: CCTs, critical care therapies; DNR, do not resuscitate; IMV, invasive mechanical ventilation; IPC, inpatient palliative care.

[a]Includes Asian or Pacific Islander, Native American, or other as coded on the California State Inpatient Database.