

# Association of code status discussion with invasive procedures among advanced-stage cancer and noncancer patients

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**Background:** Code status discussion is associated with a decrease in invasive procedures among terminally ill cancer patients. We investigated the association between code status discussion on admission and incidence of invasive procedures, cardiopulmonary resuscitation (CPR), and opioid use among inpatients with advanced stages of cancer and noncancer diseases.

**Methods:** We performed a retrospective cohort study in a single center, Ito Municipal Hospital, Japan. Participants were patients who were admitted to the Department of Internal Medicine between October 1, 2013 and August 30, 2015, with advanced-stage cancer and noncancer. We collected demographic data and inquired the presence or absence of code status discussion within 24 hours of admission and whether invasive procedures, including central venous catheter placement, intubation with mechanical ventilation, and CPR for cardiac arrest, and opioid treatment were performed. We investigated the factors associated with CPR events by using multivariate logistic regression analysis.

**Results:** Among the total 232 patients, code status was discussed with 115 patients on admission, of which 114 (99.1%) patients had do-not-resuscitate (DNR) orders. The code status was not discussed with the remaining 117 patients on admission, of which 69 (59%) patients had subsequent code status discussion with resultant DNR orders. Code status discussion on admission decreased the incidence of central venous catheter placement, intubation with mechanical ventilation, and CPR in both cancer and noncancer patients. It tended to increase the rate of opioid use. Code status discussion on admission was the only factor associated with the decreased use of CPR ( $P < 0.001$ , odds ratio = 0.03, 95% CI = 0.004–0.21), which was found by using multivariate logistic regression analysis.

**Conclusion:** Code status discussion on admission is associated with a decrease in invasive procedures and CPR in cancer and noncancer patients. Physicians should be educated about code status discussion to improve end-of-life care.

**Keywords:** noncancer, end-of-life discussion, palliative care, cardiopulmonary resuscitation, DNR, quality of death

## Introduction

Cardiopulmonary resuscitation (CPR) is the default standard of care in hospitals after cardiopulmonary arrest unless a do-not-resuscitate (DNR) order is written with the consent of the patient.<sup>1–3</sup> In the USA, physicians are required to discuss and officially order a code status when patients are admitted to a hospital.<sup>3</sup> In contrast, this practice is not obligatory in Japan. Even in the case of patients with an advanced stage of disease, some doctors discuss code status on admission and others do not. Consequently, we often observe inappropriate CPR for terminally ill inpatients in Japan, whereas some physicians do not perform CPR without discussing the code status with patients if it appears

to be futile or inappropriate. No previous studies have reported whether code status discussion on admission decreases the use of invasive procedures and CPR among inpatients with advanced stages of illness in Japan. Several studies have found that end-of-life discussion decreases invasive treatments among terminal cancer patients.<sup>4-7</sup> In patients who died on an oncology ward, code status documentation within 48 hours of admission was associated with less aggressive end-of-life care, regardless of the reason for admission.<sup>4</sup> However, it has not yet been elucidated whether code status discussion on admission decreases CPR and invasive procedures among inpatients with advanced stages of diseases other than cancer. Therefore, we investigated the association of code status discussion on admission with aggressive procedures among patients with not only advanced-stage cancer, but also noncancer diseases.

## Methods

### Ethical approval

The study protocol for this retrospective cohort study was approved by the Institutional Review Board of Ito Municipal Hospital, Shizuoka, Japan. Informed consent from each patient was waived by the Ethics Committee because we used only retrospective de-identified patient data.

## Study population

Study participants were patients who had been admitted to Ito Municipal Hospital between October 1, 2013, and April 30, 2015, with advanced stages of diseases. Ito Municipal Hospital serves a population of 70,000 patients; ~4,000 patients are admitted to this hospital per year, with approximately half of them admitted to surgical units and half to internal medicine units. Most internal medicine patients are treated by general internists. The hospital does not have a palliative care service; therefore, internists perform palliative care by themselves. Advanced-stage cancer was defined by a score of <70 points on the Palliative Performance Scale.<sup>8</sup> The advanced stages of various other diseases were defined according to a previous report, which describes the characteristics of noncancer presentations with a median survival of ≤6 months (Table 1).<sup>9</sup> Patients who died in the emergency room were excluded.

## Data collection

Data were collected by a retrospective review of electronic health charts. We collected age, sex, activities of daily livings (ADLs), and comorbidities. We calculated ADLs by using the Katz index, excluding the factor of incontinence, with a maximum score of 5 (independent) and minimum score of

**Table 1** Presentations associated with a median survival of ≤6 months, with effect of treatments on survival

Terminal illness presentation	
<b>Cardiovascular disease, heart failure</b>	
Hospitalization for moderate-to-severe symptomatic heart failure, NYHA Class III or IV, with 3 or more of the following presentations:	Age >70 years Left ventricular ejection fraction ≤20% Serum B-type natriuretic peptide >950 pg/mL Cardiac troponin I >0.4 ng/mL C-reactive protein >3.5 mg/L Fourth hospitalization for heart failure or repeat hospitalization in 2 months Dependency of 3 or more activities of daily living or need for home care after hospital discharge Weight loss of ≥2.3 kg within 2 months or serum albumin <2.5 g/dL History of cardiogenic shock, ventricular or supraventricular arrhythmia, cardiac arrest, cardiopulmonary resuscitation, or mechanical ventilation Systolic blood pressure ≤110 Serum creatinine >2 mg/dL or blood urea nitrogen >40 mg/dL Serum sodium <135 mEq/L Cardiovascular disease (ischemic, peripheral vascular, or cerebrovascular disease) Other comorbid illness (diabetes mellitus, dementia, chronic obstructive pulmonary disease, cirrhosis, and cancer)
<b>Geriatric syndromes</b>	
<b>Dementia</b>	
Advanced dementia with dependency in all activities of daily living, bedbound status, urinary and bowel incontinence, decreased ability to communicate verbally, and admission to a hospital or skilled nursing facility, with 1 or more of the following presentations:	Malnutrition (manifested by body mass index <18.5 kg/m <sup>2</sup> , decreased oral intake, or significant weight loss) Presence of at least 1 pressure ulcer Evidence of at least 1 comorbid illness Male sex plus age >90 years Placement of a nasogastric or gastrostomy feeding tube, due to inability to eat or history of aspiration pneumonia

(Continued)

**Table 1** (Continued)

<b>Geriatric failure to thrive</b>	
Age >75 years, serum albumin <3.5 g/dL, and dependency in ≥2 activities of daily living, with admission to an acute care hospital or skilled nursing facility and 1 or more of the following presentations:	Dependency in all activities of daily living with malnutrition (weight loss ≥10% of body weight or serum albumin <3 g/dL) Evidence of heart failure Serum creatinine >3 mg/dL Evidence of delirium during hospitalization Significant disability before hospitalization, with further functional decline posthospitalization
<b>Hepatic disease</b>	
<b>Cirrhosis</b>	
Decompensated hepatic cirrhosis and 1 or more of the following presentations:	Child–Pugh score ≥12 MELD score ≥21
Decompensated hepatic cirrhosis with hospitalization for an acute illness related to liver disease and 1 or more of the following presentations:	Child–Pugh score ≥10 MELD score ≥18 Child–Pugh score ≥9 plus dependency in ≥3 activities of daily living and malnutrition (significant weight loss and albumin <2.5 g/dL) Hospitalization in an intensive care unit related to severe decompensation of liver disease, with hypotension requiring the use of pressors, serum creatinine >1.5 mg/dL, or evidence of jaundice Evidence of hepatopulmonary syndrome or rapidly progressive hepatorenal syndrome
<b>Pulmonary disease</b>	
<b>COPD</b>	
Hospitalization for a severe COPD exacerbation, with hypoxemia ( $pO_2 \leq 55$ mm Hg), hypercapnia ( $pCO_2 \geq 50$ mm Hg), and supplemental oxygen dependence, with 3 or more of the following presentations:	Age >70 years Evidence of right-sided heart failure (cor pulmonale) Repeat hospitalization for COPD within 2 months History of intubation and mechanical ventilation Karnofsky performance status <60 or dependency of 3 or more activities of daily living before the hospitalization Need for home care after hospital discharge Malnutrition (weight loss of ≥2.3 kg, serum albumin <2.5 g/dL, or body mass index <18 kg/m <sup>2</sup> ) Serum creatinine >2 mg/dL
<b>Renal disease</b>	
<b>End-stage renal disease</b>	
End-stage renal disease on dialysis, with age >70 years and 2 or more of the following presentations:	Karnofsky performance status <50 or dependency in activities of daily living Significant comorbid condition such as coronary artery disease, peripheral vascular disease, heart failure, and cancer Malnutrition (body mass index <19.5 kg/m <sup>2</sup> or serum albumin <2.2 mg/dL) Residence in a skilled nursing facility Admission to an intensive care unit for an acute illness Hip fracture with inability to ambulate
End-stage renal disease without the use of dialysis, with age >70 years and 1 or more of the following presentations:	Dialysis withheld for those with decreased performance status and significant comorbidity Dialysis withdrawn due to advanced age, functional dependence, and comorbidity

**Note:** Reproduced from *Am J Med*, 125, Salpeter SR, Luo EJ, Malter DS, Stuart B, Systematic review of noncancer presentations with a median survival of 6 months or less, 512.e1–512.e6, Copyright (2012), with permission from Elsevier.<sup>9</sup>

**Abbreviations:** COPD, chronic obstructive pulmonary disease; MELD, Model of End-Stage Liver Disease; NYHA, New York Heart Association.

0 (very dependent).<sup>10</sup> “Presence of code status discussion on admission” was defined as a documentation of a physician asking the patients their preference regarding life-prolonging treatment, including intubation with mechanical ventilation and electrical cardioversion for non–cardiac arrest events and CPR for cardiac arrest events, within 24 hours after admission. Whether these procedures as well as central venous catheter placement were actually performed during hospitalization was recorded, along with the information about

opioid prescriptions. Data regarding the length of hospital stay were also collected.

## Statistical analysis

Continuous variables were expressed as medians (interquartile range), and discrete variables were summarized as percentages. Continuous variables were analyzed and compared by using the Mann–Whitney *U*-test, and dichotomous variables were analyzed and compared by using the  $\chi^2$  test.

The influence of code status discussion, on admission, on the incidence of high-burden invasive procedures, including central venous catheter placement, intubation with mechanical ventilation, and CPR, as well as opioid treatment, was evaluated by using  $\chi^2$  test among patients stratified into cancer and noncancer groups. Factors associated with the incidence of CPR were analyzed by using multivariate logistic regression analysis. IBM® SPSS® software Version 22 (IBM Corporation, Armonk, NY, USA) was used to perform the statistical analysis. *P*-values <0.05 were considered statistically significant.

## Results

### Patient characteristics

In total, 318 patients died in our hospital during the study period. We excluded 86 patients because 66 patients died in the emergency room and 20 patients did not meet the criteria of advanced-stage disease. Ultimately, 232 patients were included in this study. Code status was discussed on admission with 115 patients and not discussed with the remaining 117 patients. Table 2 presents the characteristics of these two groups. There were no significant differences in age, sex, or ADLs. Among cancer patients (*n*=97), 56 (67%) of them had code status discussion on admission, whereas among noncancer patients (*n*=135), 59 (44%) of them had code status discussion on admission (*P*<0.05). The incidence of code status discussion on admission for each primary diagnosis was as follows: liver disease (6 of 14, 43%; *P*=0.223), heart

disease (5 of 24, 21%; *P*<0.01), renal disease (0 of 2, 0%; *P*=0.186), cerebrovascular disease (3 of 3, 100%; *P*=0.201), lung disease (6 of 26, 23%; *P*<0.01), and geriatric syndrome or dementia (39 of 66, 53%; *P*=0.63); (*P*-values in comparison with the cancer group).

### Incidence rate of code status discussion and CPR

On admission, 115 (49.6%) of 232 patients had a code status discussion with their physicians, of which 114 (99.1%) patients had DNR orders and 1 (0.9%) patient had CPR without a DNR order (full code). Of the remaining 117 (50.4%) patients who did not have a code status discussion on admission, 69 (59.0%) patients had code status discussion and conveyed DNR orders during hospitalization. Among the remaining 48 patients with whom code status was never discussed, 32 (27.0%) of 117 patients received CPR due to the absence of DNR orders, and 16 (13%) of 117 patients did not receive CPR despite the absence of a documented code status discussion or DNR orders.

### Presence of code status discussion, life-prolonging procedures, length of stay, and opioid use

The absence of code status discussion on admission significantly increased the incidence of central venous catheter placement (3.5% vs. 19.7%, *P*<0.001, odds ratio [OR]=5.65, 95% CI=2.01–15.8), intubation with mechanical ventilation

**Table 2** Patient characteristics

Variables	Presence of code status discussion (n=115)	Absence of code status discussion (n=117)	<i>P</i> -value
Age, median (25th, 75th percentile)	82 (75, 88)	80 (74, 87)	0.294
Male, n (%)	68 (59)	63 (54)	
Independent ADLs, n (%)	32 (28)	36 (31)	0.67
Comorbidities, n (%)			
Heart failure	30 (26)	52 (44)	<0.01
Cerebrovascular disease	28 (24)	23 (20)	0.43
Chronic lung disease	19 (17)	31 (27)	0.079
Chronic kidney disease	25 (21)	20 (17)	0.409
Cancer	64 (55)	49 (42)	<0.05
Dementia	81 (70)	75 (64)	0.33
Primary diagnosis <sup>a</sup> , n (%)			
Cancer	56 (49)	41 (35)	<0.05
Liver disease	6 (5.2)	8 (6.8)	0.78
Heart disease	5 (4.3)	19 (16.2)	<0.01
Renal disease	0 (0)	2 (1.7)	0.50
Cerebrovascular disease	3 (2.6)	0 (0)	0.12
Lung disease	6 (5.2)	20 (17.1)	<0.05
Geriatric syndrome or dementia	39 (33.9)	27 (23.1)	0.11

**Note:** <sup>a</sup>Advanced stage of illness by which prognosis is estimated.

**Abbreviation:** ADLs, activities of daily livings.

(1.7% vs. 26.5%,  $P<0.001$ , OR =15.2, 95% CI =3.7–62.1), and CPR (0.9% vs. 27.4%,  $P<0.001$ , OR =31.5, 95% CI =4.3–226.4). Similar trends were observed in both cancer patients and noncancer patients (Figure 1A and B). The median length of stay was not statistically different between patients who did and did not have a code status discussion (17 days [10, 34] vs. 17 days [9, 30], respectively,  $P=0.895$ ). Code status discussion on admission tended to increase the rate of opioid use (40% vs. 28%,  $P=0.072$ , OR =1.2, 95% CI =0.99–1.44).

## Factors associated with the incidence of CPR

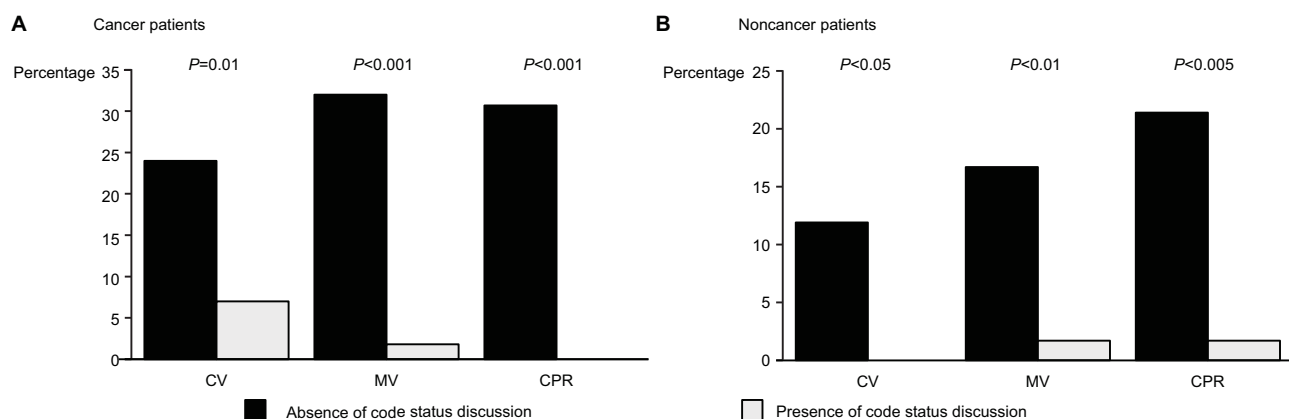
CPR was performed in 33 (14%) of 232 patients. Table 3 shows the factors associated with CPR. In a multivariate analysis including 5 factors (ie, age >75 years, primary diagnosis of cancer, pulmonary disease, geriatric syndrome or dementia, and code status discussion), only the presence of code status discussion on admission was significantly

associated with the decreased incidence of CPR ( $P<0.005$ , OR =0.03, 95% CI =0.004–0.21).

## Discussion

In this study, physicians did not discuss code status with about half of the patients on admission although they were with advanced stages of diseases. It has been reported that code status discussion on admission decreases invasive treatment among terminal cancer patients.<sup>4–7</sup> This study is the first to show that code status discussion on admission is significantly associated with the reduction of invasive procedures and CPR among both cancer and noncancer patients. This study also demonstrated that code status discussion on admission tended to increase the use of opioids, which may indicate better quality of care in our study population.

Currently, CPR is the default standard of care after cardiopulmonary arrest unless a DNR order is written with the consent of the patient,<sup>1,2</sup> even in the end stage of illness.<sup>3</sup> According to the recommendation by the Joint Commission,



**Figure 1** Incidence of invasive procedures and cardiopulmonary resuscitation among cancer patients (A) and noncancer patients (B) in the presence and absence of code status discussion on admission.

**Abbreviations:** CPR, cardiopulmonary resuscitation; CV, central venous catheter placement; MV, intubation and mechanical ventilation.

**Table 3** Factors associated with CPR

Factor	n	Incidence of CPR, n (%)	OR (95% CI) (adjusted <sup>a</sup> )
Age ≥75 years	173	23 (13)	0.75 (0.3–2.0)
Primary diagnosis			
Cancer	97	9 (9)	0.42 (0.15–1.22)
Liver disease	15	4 (27)	
Heart disease	24	6 (25)	
Renal disease	2	1 (50)	
Neurovascular disease	3	0 (0)	
Respiratory disease	26	8 (31)	1.1 (0.34–3.43)
Geriatric syndrome or dementia	66	5 (8)	0.38 (0.11–1.28)
Presence of code status discussion on admission	115	1 (0.9)	0.03 (0.004–0.21)*

**Notes:** <sup>a</sup>Adjusted for age ≥75 years; cancer, respiratory disease, or geriatric syndrome/dementia as a primary diagnosis; and absence of code status discussion on admission; \* $P<0.001$ .

**Abbreviations:** CPR, cardiopulmonary resuscitation, OR, odds ratio.

all hospitals and medical institutions are required to have formal procedures for discussing, documenting, and implementing DNR orders.<sup>3</sup> Similar recommendations have been made by the American Society of Clinical Oncology<sup>11</sup> and the American Medical Association.<sup>1</sup> Legally, the US Patient Self-Determination Act of 1990 requires hospitals, nursing homes, health maintenance organizations, and hospices that participate in Medicare and Medicaid to ask whether the patient has an advance directive, to provide information about them, and to incorporate advance directives into the medical record.<sup>12</sup> The American College of Physicians encourages physicians to routinely raise the topic of advance planning with patients who have decision-making capacity and encourage them to review their values and preferences with their surrogates and family members before an acute crisis.<sup>13</sup> In spite of these guidelines and law, ~80%–90% of inpatients reportedly did not have a code status discussion even in the USA.<sup>14,15</sup>

In Japan, the Ministry of Health, Labour and Welfare established a guideline for the decision-making process for end-of-life care in 2007, which was updated in 2015.<sup>16</sup> The Guideline stresses the importance of not only the patients' medical condition, but also their values and preferences in the decision-making process.<sup>16</sup> In our study, DNR order was discussed with only 50% of patients on admission, although they were with an advanced stage of disease. A survey conducted by the Japanese Ministry of Health, Labour and Welfare in 2013 found that ~70% of respondents would not like to have invasive treatment if they become terminally ill and ~70% would like to establish advance directives, although only 3% of them had.<sup>17</sup> In another survey of middle-aged and older adults in Tokyo, Japan, 60% of respondents stated that they would like to express their wishes regarding advance directives, but <10% had already done so.<sup>18</sup> Therefore, physicians can play a role in helping patients to express their values and preferences regarding end-of-life issues, especially when they are with advanced stages of disease.

As patients approach death, physicians must consider treatments to improve the quality of dying and death, focusing on palliative care, quality of life, and patient and family satisfaction rather than prolonging life.<sup>19,20</sup> In terms of palliative care for patients with advanced stages of illness, a holistic approach should be adopted, including end-of-life discussion; assessment and treatment of symptoms; psychological, spiritual, and bereavement support; and coordination of care.<sup>21</sup> End-of-life communication should begin with establishing the goal of care.<sup>21</sup> Communication of prognosis is also important. Without these discussions, physicians

often fail in discussing the decision to withhold or withdraw aggressive care. Although physicians may worry that disclosing a realistic prognosis might make patients depressed and cause them to lose hope or that involving palliative care may reduce survival, several reports have demonstrated the opposite.<sup>22</sup> Some patients wish to receive invasive treatment solely because they lack a full understanding of their own prognosis.<sup>22,23</sup> It was reported that prognostic disclosures are associated with more realistic patient expectations of life expectancy, without decrements to their emotional well-being or the patient–physician relationship among patients with advanced-stage solid malignancies.<sup>24</sup> Having a realistic expectation of life expectancy was also associated with DNR orders.<sup>24</sup> CPR has been reported to decrease the quality of life among patients with advanced-stage cancer,<sup>25–28</sup> while having a low probability of resuscitation of cardiopulmonary functions or hospital discharge for terminal cancer patients.<sup>29</sup> End-of-life discussion was associated with a decrease in invasive procedures, including central venous catheter placement, intubation with mechanical ventilation, CPR, and increase in opioid use in this study. These changes in clinical practice could potentially decrease the medical cost and grief of the family and improve the quality of life, as previously reported.<sup>7,30</sup> In a report, among 12 terminally ill cancer patients in whom initial code status discussion shortly after admission resulted in full code, all of them changed their status to DNR after being fully informed of their prognosis before cardiopulmonary arrest.<sup>4</sup> This may indicate that early code status discussions resulting in full code orders may also provide patients and surrogate decision-makers the time to consider less aggressive end-of-life care and reconsider DNR orders.<sup>4</sup> To decrease the rate of undesired CPR, it is necessary to learn appropriate prognostication and prognosis communication skills and initiate code status discussion in the early phase of advanced-stage disease. Education concerning code status is necessary in all hospitals in Japan as it faces a super-aging society.<sup>31,32</sup>

Notably, our study demonstrated that code status discussion also decreased the incidence of CPR and invasive procedures in patients with noncancer diseases. Furthermore, code status discussion occurred on admission more frequently for patients with a primary diagnosis of cancer than for noncancer patients, more specifically those with cardiac and pulmonary diseases in our study, which is consistent with the result of a previous study.<sup>14</sup> In case of chronic heart failure or pulmonary disease, patients' health status declines slowly with occasional acute exacerbation, from which they often recover.<sup>33,34</sup> In contrast, patients with the advanced stage of



cancer have a more predictable progressive downward trajectory with clear prognosis.<sup>33,35</sup> Therefore, it is more challenging to estimate the prognosis of chronic heart failure and chronic obstructive pulmonary disease than that of cancer.<sup>33</sup> It was reported that physicians often avoided end-of-life discussion with patients with heart failure for fear of causing alarm and destroying hope.<sup>36</sup> As a result, end-of-life discussion is often deferred until more emergent and less favorable occasions. Although heart failure has a poorer prognosis than many cancers, patients with heart failure establish DNR orders later in the disease course and receive more life-sustaining treatments, including CPR, than cancer patients.<sup>37</sup> Chronic obstructive pulmonary disease has a similar situation to heart failure.<sup>38</sup> Consequently, these patients often have little idea on their prognosis and may have unrealistically optimistic expectations of their prognosis.<sup>39,40</sup> Physicians should not delay the initiation of end-of-life discussions with patients with advanced-stage cancer as well as noncancer diseases to provide better quality of care.

Our study has several limitations. First, this study was conducted in a single center; therefore, the results cannot be extrapolated to other hospitals in Japan or to other countries. Second, because of the nature of a retrospective chart review, it is not possible to determine whether the decrease in invasive procedures resulted from code status discussion itself or from a tendency for physicians who have code status discussions with patients in their daily practice to withhold invasive procedures in terminal situations. Finally, we cannot exclude the possibility that the patients with a poorer prognosis, for whom invasive procedures or CPR was obviously more inappropriate, were more likely to have a code status discussion in advance; therefore, the presence of code status discussion might be simply an indicator of poorer prognosis. However, the finding that the presence or absence of code status discussion on admission was not associated with a statistical difference in patients' length of hospital stay before death suggests that the two groups had similar prognoses. Nonetheless, we believe that our study highlights the importance of code status discussions in hospital settings to avoid unnecessary invasive procedures or CPR in cases of terminal illness.

## Conclusion

Our study demonstrated that code status discussion was associated with a decrease in CPR and other high-burden invasive procedures. It also was associated with a trend for increased use of opioids among patients with advanced stages of various diseases.

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## Author contributions

All authors contributed toward data analysis, drafting and revising the paper and agree to be accountable for all aspects of the work.

## Disclosure

The authors report no conflicts of interest in this work.

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