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The Interactive Effect of Advanced Cancer Patient and Caregiver Prognostic Understanding on Patients' Completion of Do Not Resuscitate Orders

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Abstract

Objective: Advanced cancer patients' prognostic understanding is associated with completion of Do Not Resuscitate (DNR) orders, which often represent engagement in advance care planning (ACP). Given caregivers' critical roles in patient decision-making about ACP and end-of-life care, caregivers' prognostic understanding may have a large additive effect. The present study examined the association between the main and interactive effects of advanced cancer patient and caregiver prognostic understanding on DNR order completion.

Methods: Data were analyzed from a combined dataset of two sequential multi-institutional, longitudinal cohort studies of patients with advanced cancer and their informal caregivers (n=279 dyads) from 2002-2008 [Coping with Cancer 1] and 2010-2015 [Coping with Cancer 2]. Patients' and caregivers' prognostic understanding regarding life-expectancy [≤ 12 months (prognostic understanding), > 12 months (lack of prognostic understanding)] was assessed. DNR order completion was assessed through self-report and confirmed through cross-checking with medical records.

Results: Multivariable modeling of the main and interactive effects revealed the interactive effect, but not the individual effects, of patients' and caregivers' prognostic understanding was significantly associated with higher odds of patients' DNR order completion, adjusting for potential confounds (AOR=5.89, p=0.04). For dyads in which both the patient and caregiver had prognostic understanding regarding life-expectancy of ≤ 12 months, 70.7% of patients had completed DNR orders compared to 31.6%-38.9% in which one or both lacked prognostic understanding.

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Conflict of Interest

The authors have no conflicts of interest to report.

Ethics Statement

All study procedures were reviewed at approved at each Institution's IRB (IRB Protocol Number: DFCI 05-039). All procedures were done in accordance with required ethical guidelines for protection of human subjects in research. Informed, written consent was obtained from each participant in the present study.

Conclusions: Findings highlight the need for ensuring accurate patient and caregiver prognostic understanding in increasing DNR order completion, which may provide a framework for improving engagement in ACP more broadly.

Keywords

advanced cancer; cancer caregivers; prognostic accuracy; do-not-resuscitate (DNR) order; end of life

Introduction

Prognostic understanding is critical to advanced cancer patients' ability to make informed decisions about end-of-life (EoL) care. Prognostic understanding of advanced cancer patients has been defined as an acknowledgment that the end of their life is near (e.g., that patients are likely to have months, rather than years, left to live).¹ Such prognostic understanding has been linked to understanding advanced cancer patient preferences for comfort care over aggressive, life-extending care;² receipt of less aggressive care at the end of life;^{3,4} and a greater likelihood of dying in the patients' preferred place of death (e.g., home).⁴ Patients with prognostic understanding are also more likely to complete Do Not Resuscitate (DNR) orders.^{5,6} DNR orders represent, more broadly, engagement in advance care planning (ACP) and involvement in shared decision-making regarding EoL care; they have been associated across multiple studies with a decrease in rates of aggressive care near the EoL and increase in utilization of hospice and palliative care.⁷

Advanced cancer patients who estimated that they had longer life-expectancies than they actually have, have been shown to be less likely to complete DNR orders than patients with more realistic life-expectancy estimates.⁶ Because DNR orders have been shown to protect patients from burdensome, aggressive, and costly intensive EoL care⁸ and be associated with utilization of palliative and hospice care,⁷ they are often an effective means of improving the quality of EoL care that advanced cancer patients receive.

Research suggests that approaches to promoting the completion of DNR orders may be most successful if they target both patients and their caregivers.⁹ This may be due to the integral role caregivers play in helping advanced cancer patients make informed decisions at the EoL.^{10,11} Dying patients have also been shown to have a higher likelihood of accepting death if their primary informal caregiver accepts that the patient is dying.¹² Moreover, approximately half (51%) of cancer patients report wanting family caregivers and physicians to share responsibility for decision-making if they become too ill to participate.¹³ This finding further highlights the potential critical role of caregivers' prognostic understanding in enhancing patients' informed EoL care decision making. Despite the importance of involving caregivers in promoting engagement in planning for EoL care and completion of DNR orders, few studies have considered the role of the informal caregivers' prognostic understanding in influencing these outcomes.¹⁴

The goal of the present study is to examine the independent and interactive effects of advanced cancer patients' and caregivers' prognostic understanding on patients' DNR order completion rates. We hypothesized that the interactive effect of patients' and caregivers'

prognostic understanding would be associated with higher rates of DNR order completion over and above the main effects of patient and caregiver prognostic understanding.

Methods

Study Sample and Procedures

Data were derived from two similar cohorts of advanced cancer patients and their informal, unpaid caregivers. The first cohort (Coping with Cancer 1; CwC1) was enrolled between September 2002 and February 2008; the second cohort (Coping with Cancer 2; CwC2) was enrolled between January 2011 and May 2015. CwC1 and CwC2 are prospective, multi-institutional cohort studies funded by the National Cancer Institute and National Institute of Mental Health designed to evaluate psychosocial influences among advanced cancer patients and their informal caregivers on patients' prognostic understanding, EoL care, and quality of death. See online supplement for a full listing of participating institutions. Institutional Review Boards at all participating institutions approved the study procedures and all participants provided written, informed consent (IRB Protocol Number: DFCI 05-039).

Eligibility criteria for both CwC1 and CwC2 included: (1) patient diagnosis of poor prognosis advanced cancer (defined by presence of distant metastases and/or disease progression following at least first-line chemotherapy and clinician's estimate that the patient would live ≤ 6 months); (2) patient and caregiver ≥ 21 years; (3) patient and caregiver ability to speak English or Spanish; and (4) adequate physical and psychological well-being of patient and caregiver to complete study interviews. Patients were excluded from these studies if they demonstrated obvious signs of cognitive impairment (e.g., dementia or delirium as assessed by oncologists) and/or if they made more than six errors on the Short Portable Mental Status Questionnaire (SPMSQ).¹⁵

After obtaining informed written consent, patients' medical records and primary oncologist were consulted to confirm eligibility. Trained research staff conducted a structured interview with each patient and caregiver at study entry during which all measures were verbally administered to overcome potential literacy barriers, enhance data accuracy, and reduce the frequency of missing data. All interviews were conducted in English or Spanish. Interviews lasted 30-45 minutes.

Measures

Demographic and clinical characteristics—Patients self-reported age, sex, race, educational level, insurance status, and Karnofsky performance status.¹⁶ Caregivers self-reported age, sex, race, ethnicity, and educational level. All demographic and clinical characteristics mentioned here were assessed and included in final regression models (see Results section) based on prior research indicating their relationship with DNR order completion to provide a conservative estimate of confounding effect(s).

Patients' and caregivers' prognostic understanding: Life-expectancy estimates—In CwC1, patients and caregivers were asked, "How long do you think you have [the patient has] left to live?" Responses were given in terms of months and years. Responses of ≤ 12 months were coded as "1" = prognostic understanding and responses of $>$

12 months were coded as “0” = lack of prognostic understanding. In CwC2, patients and caregivers were each asked, “Many patients have thoughts about how having cancer might affect their [the person with cancer that they care for] life-expectancy, either based on what their doctors have told them, what they have read, or just their own sense about how long they might live with cancer. When you think about this, do you think in terms of:” Response options included the following: months and years. Responses of “years” were coded as: “0” = lack of prognostic understanding and responses of “months” were coded as “1” = prognostic understanding. Thus, across both data sets, life-expectancy estimates were categorized as ≤ 12 months and > 12 months.

The cutoff of ≤ 12 months was selected based on patient’s estimated prognosis as well as prior research demonstrating operationalization of prognostic understanding as ≤ 12 months was significantly associated with important EoL outcomes among an advanced cancer patient population.¹⁷ Moreover, this measure of prognostic understanding correlates highly with other measures of prognostic understanding such as terminal illness acknowledgment and recognition of incurable disease status.¹

Completion of DNR order—In CwC1 and CwC2, patients were asked in the baseline assessment if they had a DNR order on file. This self-report measure was confirmed by DNR orders identified in the medical record. Response options were coded as “0” = no and “1” = yes. Only responses where the medical record identified cases were confirmed by patient report were counted as “yes.”

Analytic Procedure

Data from CwC1 and CwC2 were combined into a single dataset, which was facilitated by the substantial overlap in eligibility criteria and consistency of measures in the combined datasets. This combined dataset produced a large, more diverse dataset spanning 2002 to 2015.

Descriptive statistics provided information about the distribution of patient and caregiver characteristics. Chi-square statistics and *t* tests were used to examine the relationship between the main outcome variable (DNR order completion) and demographic and clinical characteristics.

A logistic regression model, adjusting for potential demographic and clinical confounders as listed in the methods, was used to evaluate the effect of patient prognostic understanding, caregiver prognostic understanding, and the interactive effect of patient and caregiver prognostic understanding on patients’ DNR order completion rates at the “baseline” assessment. An alpha level of $p < .05$ was the threshold for statistical significance; all tests were two-sided. The presence of a significant interactive effect was interpreted by graphing the interaction’s effect on the main outcome, DNR order completion.

Results

Demographic and Medical Characteristics

Of the 1,570 eligible patients ($n=993$ CwC1, $n=577$ CwC2), 1,115 (71.0%) ($n=726$ CwC1, $n=389$ CwC2) completed study measures. Of these 1,115 participating patients, 279 (25.0%) had complete data for both their caregiver and DNR order completion outcomes. Thus, $n=279$ patient-caregiver dyads were included in the final analytic sample of the CwC1 and CwC2 merged dataset. The mean patient age was 60.18 years old ($SD=11.95$) and the mean caregiver age was 54.48 years old ($SD=14.06$). Patients were predominately white (86.1%), female (56.9%), and college educated or higher (58.0%). Caregivers were predominately white (85.0%), female (63.7%), and college educated or higher (59.7%). See Table 1 for a description of sample characteristics.

Four possible combinations of dyads were created: (1) both the patient and caregiver had prognostic understanding (i.e., life-expectancy estimate of 12 months); (2) neither the patient nor the caregiver had prognostic understanding; (3) the patient had prognostic understanding but the caregiver did not; and (4) the patient did not have prognostic understanding but the caregiver did. Only 27.8% of dyads had both a patient and caregiver with prognostic understanding; 72.2% of dyads contained one or more members who lacked prognostic understanding (Table 2). The most common dyad was one in which both patients and caregivers lacked prognostic understanding (44.4%). Dyads in which the patient and caregiver had prognostic understanding reported the highest rates of DNR order completion (71% vs. 32-39%, respectively; Table 2).

Patient DNR Order Completion Rates

Results of the logistic regression analysis indicated that neither the main effects of patients' and caregivers' prognostic understanding nor the potential confounders were significant predictors of DNR order completion. The only significant predictor of DNR order completion was the interactive effect of patients' and caregivers' prognostic understanding ($AOR=5.89$, $p=.04$; Table 3). As displayed in Figure 1, 70.7% of the dyads in which both the patient and caregiver had prognostic understanding of the patient's life expectancy being 12 months had a completed patient DNR compared to 36.3% of those in which neither had prognostic understanding, 38.9% of those in which only the patient had prognostic understanding, and 31.6% of those in which only the caregiver had prognostic understanding.

Discussion

The present study sought to examine the association between the main and interactive effects of patients' and caregivers' prognostic understanding and patients' DNR order completion, a proxy for engagement in ACP more broadly. Results from the present study indicate the combined effect of both patient and caregiver prognostic understanding regarding life-expectancy is associated with higher rates of patient DNR order completion. Namely, dyads in which both the patient and caregiver had prognostic understanding were more likely to have a completed patient DNR order. It is notable that dyads in which both the patient and

caregiver have prognostic understanding had double the rate of completed patient DNR orders compared to all other dyads in which at least one member of the dyad lacked prognostic understanding. Expanding on prior research on the importance of advanced cancer patients' prognostic understanding,^{1,2,5,6,18} this finding suggests ensuring that both the patient and his/her informal caregiver understand that the patient is likely to die within the following year may promote DNR completion among advanced cancer patients (e.g., metastatic cancer patients with chemo-refractory disease). This study does not identify the mechanisms underlying the relationship between shared prognostic understanding and DNR order completion. It is possible that dyads with a shared prognostic understanding discussed the patient's disease and treatment with a medical provider, resulting in better prognostic understanding and DNR order completion. Dyads in which the patient and caregiver understand the prognosis may also be more likely to engage in shared decision-making, resulting in higher rates of DNR order completion. Future research should examine the mechanisms by which prognostic understanding is related to DNR order completion in order to inform interventions that improve engagement in advance care planning.

Improving DNR order completion rates is often the best way to ensure that advanced cancer patients are not subject to burdensome intensive care near death.⁸ Additionally, those who have a DNR order have been shown to be more likely to receive palliative or hospice care.⁷ Perhaps due to their ability to help ensure quality EoL care, completion of advance directives and engagement in ACP are now being mandated by the Centers for Medicare and Medicaid Services' (CMS) Oncology Care Model (OCM).¹⁹ Because advanced cancer patients who are more aware of their prognosis are more likely to prefer comfort care over aggressive, life-extending care;² it is important to ensure these patients' wishes are documented formally through DNR orders in cases in which this is their preference.

This study identifies patient and caregiver prognostic understanding as a potentially modifiable target associated with higher rates of DNR order completion. Additionally, findings from this study indicate the need for improving rates of prognostic understanding among patients and caregivers. Given the high proportion of dyads in the present study in which the patient, caregiver, or both lacked prognostic understanding (72.2%), interventions targeting dyadic prognostic understanding are critical. They hold the potential to make a large, impactful clinical difference not only in DNR order completion, where appropriate, but in completion of other forms of advance directives, such as living wills and health care proxies. Future research is needed to examine the effect of patient-caregiver concordance regarding prognostic understanding on these additional ACP engagement outcomes. These results further support the need for a targeted intervention to improve both patients' and caregivers' prognostic understanding.

This form of intervention may also be important given that caregivers' understanding of patients' prognosis takes on heightened importance as patients become increasingly weak and cognitively compromised.²⁰ Prior research indicates that for patients with advanced illness, patient-centered care depends to a large extent on caregiver involvement.²¹ Due in large part to the necessity of involving caregivers in advanced illness patients' care and decision making and further supported by the present findings, the critical role of caregivers in patients' care and decision making merits more attention from clinicians. Future

interventions as well as clinical models should consider how to educate and resource caregivers regarding prognostic understanding to improve the quality of EoL care among advanced cancer patients.

Our study has several unique strengths, including its utilization of two large cohort studies with advanced cancer patients and their caregivers. The use of a large, multi-institutional, prospective design that spans from 2002 to 2015 and across 13 U.S. clinics increases the generalizability of the results. These studies highlight the link between patient-caregiver prognostic understanding and DNR order completion across multiple sites and across time. Finally, this study benefits from the strength of a dyadic design in which the combined effects of patients' and caregivers' prognostic understanding could be examined to determine the role that each of these components play in predicting DNR order completion individually and in combination.

Study Limitations

Despite the strengths of this study, there are some limitations to consider when interpreting results. First, the sample consisted largely of white and highly educated patients and caregivers. Given that EoL outcomes are strongly influenced by culture, including religious and racial/ethnic disparities in treatment preferences, planning, and care,^{22–24} research is needed to determine the generalizability of these findings across more diverse settings. That said, prior research has indicated that prognostic understanding is critical to improving EoL care planning across a variety of races, genders, and patient groups.^{23,25,26} Second, the present analyses are cross-sectional. Causal relationships between patient and caregiver prognostic understanding and completion of DNR orders cannot be inferred. Studies designed to improve prognostic understanding will provide more information on the causal relationship between patient and caregiver prognostic understanding and DNR order completion. Third, the measures assessing prognostic understanding were worded differently in CwC1 and CwC2. However, the cutoff criteria for accuracy was the same across both studies, reducing the potential difference in measurement. Furthermore, concordance rates were similar across studies, indicating that the measures likely assess similar constructs. Third, approximately a quarter of patients eligible for the study did not participate. As such, there may be participation bias in the present study. Thus, the effects estimated in the present study may not fully accurately reflect the interactive effects of patients and caregivers among patients who experience greater burden from their illness. This should be considered in interpreting the present results. Finally, only a quarter of patients who participated in the study were included in the present analyses due to a lack of caregiver data. One of the datasets used in the present analyses (CwC2) was from a study designed to compare African American to non-Hispanic white advanced cancer patients. Due to the low rate of caregivers eligible for African Americans in the present sample, patients were allowed to enroll despite not having an informal caregiver in order to improve the patient representativeness of the sample. Additionally, many caregivers were unable or unwilling to participate because interviews required them to spend time away from the patient. In future research, it is critical to examine caregiver reported barriers to enrollment in research studies and reduce these barriers in order to improve caregiver participation in the study.

Clinical Implications

The present study findings indicate the potential importance of medical providers ensuring that not only patients have an accurate prognostic understanding but that their caregivers do as well. Because the combined effects of patient and caregiver prognostic understanding influence patient outcomes, it may be critical to work towards a shared an accurate understanding of patients' prognoses between the physician, patient, and caregiver to improve quality engagement in ACP and EoL care.

Conclusions

In summary, the present study found that having both patients and caregivers with prognostic understanding regarding life-expectancy is associated with higher DNR order completion rates. These findings highlight the importance of increasing both patients' and caregivers' prognostic understanding to improve EoL care planning and decision making. Future clinical care could work towards integrating informal caregivers, when present and appropriate, into the conversation regarding prognoses. This step may help improve both prognostic understanding and the ability to document preferred EoL care wishes among advanced cancer patients.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. Epstein AS, Prigerson HG, O'Reilly EM, Maciejewski PK. Discussions of life expectancy and changes in illness understanding in patients with advanced cancer. *Journal of Clinical Oncology*. 2016;34(20):2398–2403. [PubMed: 27217454]
2. Weeks JC, Cook EF, O'Day SJ, et al. Relationship between cancer patients' predictions of prognosis and their treatment preferences. *Jama*. 1998;279(21):1709–1714. [PubMed: 9624023]
3. Trice ED, Prigerson HG. Communication in end-stage cancer: review of the literature and future research. *Journal of health communication*. 2009;14(S1):95–108. [PubMed: 19449273]
4. Seale C, Addington-Hall J, McCarthy M. Awareness of dying: Prevalence, causes and consequences. *Social Science and Medicine*. 1997;45(3):477–484. [PubMed: 9232741]
5. Waite KR, Federman AD, McCarthy DM, et al. Literacy and race as risk factors for low rates of advance directives in older adults. *Journal of the American Geriatrics Society*. 2013;61(3):403–406. [PubMed: 23379361]
6. Enzinger AC, Zhang B, Schrag D, Prigerson HG. Outcomes of prognostic disclosure: associations with prognostic understanding, distress, and relationship with physician among patients with advanced cancer. *Journal of Clinical Oncology*. 2015;JCO. 2015.2061. 9239.
7. Brinkman-Stoppelenburg A, Rietjens JA, van der Heide A. The effects of advance care planning on end-of-life care: a systematic review. *Palliative medicine*. 2014;28(8):1000–1025. [PubMed: 24651708]

8. Garrido MM, Balboni TA, Maciejewski PK, Bao Y, Prigerson HG. Quality of life and cost of care at the end of life: the role of advance directives. *Journal of Pain and Symptom Management*. 2015;49(5):828–835. [PubMed: 25498855]
9. Fried T, Zenoni M, Iannone L. A dyadic perspective on engagement in advance care planning. *Journal of the American Geriatrics Society*. 2016.
10. Sudore RL, Fried TR. Redefining the “planning” in advance care planning: Preparing for end-of-life decision making. *Annals of Internal Medicine*. 2010;153(4):256–261. [PubMed: 20713793]
11. Winzelberg GS, Hanson LC, Tulskey JA. Beyond autonomy: Diversifying end-of-life decision-making approaches to serve patients and families. *Journal of the American Geriatrics Society*. 2005;53(6):1046–1050. [PubMed: 15935032]
12. Prigerson HG. Socialization to dying: social determinants of death acknowledgment and treatment among terminally ill geriatric patients. *Journal of health and social behavior*. 1992;378–395. [PubMed: 1464721]
13. Degner LF, Sloan JA. Decision making during serious illness: what role do patients really want to play? *Journal of Clinical Epidemiology*. 1992;45(9):941–950. [PubMed: 1432023]
14. Butow P, Maclean M, Dunn S, Tattersall M, Boyer M. The dynamics of change: cancer patients’ preferences for information, involvement and support. *Annals of Oncology*. 1997;8(9):857–863. [PubMed: 9358935]
15. Pfeiffer E A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients. *Journal of the American Geriatrics Society*. 1975;23(10):433–441. [PubMed: 1159263]
16. Karnofsky DA. Determining the extent of the cancer and clinical planning for cure. *Cancer*. 1968;22(4):730–734. [PubMed: 5212297]
17. Lambden J, Zhang B, Friedlander R, Prigerson HG. Accuracy of oncologists’ life-expectancy estimates recalled by their advanced cancer patients: Correlates and outcomes. *Journal of Palliative Medicine*. 2016;19(12):1296–1303. [PubMed: 27574869]
18. Wright AA, Zhang B, Ray A, et al. Associations between end-of-life discussions, patient mental health, medical care near death, and caregiver bereavement adjustment. *JAMA: the journal of the American Medical Association*. 2008;300(14):1665–1673. [PubMed: 18840840]
19. Carevive Systems. The Oncology Care Model (OCM) Explained. 2015 <https://www.carevive.com/the-oncology-care-model-model-explained/>.
20. Gao X, Prigerson HG, Diamond EL, et al. Minor cognitive impairments in cancer patients magnify the effect of caregiver preferences on end-of-life care. *Journal of Pain and Symptom Management*. 2013;45(4):650–659. [PubMed: 22846621]
21. Gillick MR. The critical role of caregivers in achieving patient-centered care. *JAMA*. 2013;310(6):575–576. [PubMed: 23867885]
22. Phelps AC, Maciejewski PK, Nilsson M, et al. Religious coping and use of intensive life-prolonging care near death in patients with advanced cancer. *JAMA* 2009;301(11):1140–1147. [PubMed: 19293414]
23. Trevino KM, Zhang B, Shen MJ, Prigerson HG. Accuracy of advanced cancer patients’ life expectancy estimates: The role of race and source of life expectancy information. *Cancer*. 2016;122(12):1905–1912. [PubMed: 27028270]
24. Shen MJ, Prigerson HG, Paulk E, et al. Impact of end-of-life discussions on reduction of Latino/non-Latino disparities in DNR order completion. *Cancer* 2016;122(11):1749–1756. [PubMed: 26992109]
25. Sharma RK, Prigerson HG, Penedo FJ, Maciejewski PK. Male-female patient differences in the association between end-of-life discussions and receipt of intensive care near death. *Cancer*. 2015;121(16):2814–2820. [PubMed: 25975179]
26. Fletcher K, Prigerson HG, Paulk E, et al. Gender differences in the evolution of illness understanding among patients with advanced cancer. *The Journal of Supportive Oncology*. 2013;11(3):126–132. [PubMed: 24400392]

Figure 1.

The interactive effect of patients' and caregivers' prognostic understanding on patients' rates of DNR order completion.

Table 1.

CwC sample characteristics and associations with advanced cancer patients' completion of DNR orders (N=279 dyads).

Patient Characteristics	Total n (%) ^a	n (%) DNR Order "Yes"	Association between DNR Order and Patient Characteristics
Age (yrs.)	<i>M</i> =60.18 (<i>SD</i> =11.95)	DNR Yes: <i>M</i> =62.15 (<i>SD</i> =10.86) DNR No: <i>M</i> =58.66 (<i>SD</i> =12.88)	<i>t(df)</i> = -2.31(245), <i>p</i> =.025
Race			
White	236 (86.1%)	100 (46.9%)	$\chi^2=10.91, p=.001$
Non-White	38 (13.9%)	6 (17.1%)	
Gender			
Female	157 (56.9%)	66 (46.5%)	$\chi^2=1.44, p=.230$
Male	119 (43.1%)	42 (38.9%)	
Education			
Less than college degree	107 (42.0%)	33 (34.4%)	$\chi^2=4.15, p=.042$
College degree or higher	148 (58.0%)	65 (47.8%)	
Insurance Status			
Yes	211 (79.9%)	87 (45.8%)	$\chi^2=3.07, p=.080$
No	53 (20.1%)	16 (32.0%)	
Karnofsky Performance Status	<i>M</i> =53.01 (<i>SD</i> =29.36)	DNR Yes: <i>M</i> =50.96 (<i>SD</i> =28.26) DNR No: <i>M</i> =56.62 (<i>SD</i> =29.55)	<i>t(df)</i> =1.42(210), <i>p</i> =.159

Total N=279 dyads. Variations in sample size are due to missing data. Reported percentages are valid percent based on available data.

Table 2.

Patient-caregiver dyads' prognostic understanding and associations with advanced cancer patients' DNR order completion (N=279 dyads).

	n (%)	DNR Order	% DNR Order "Yes"
Patient-Caregiver Dyads			
<i>Prognostic Understanding (Life-Expectancy Estimates)</i>		$\chi^2=21.27, p=.000$	
Patient-caregiver both estimate 12 months (i.e., both have prognostic understanding)	60 (27.8%)		70.7%
Patient-caregiver both estimate > 12 months (i.e., neither have prognostic understanding)	96 (44.4%)		36.3%
Patient estimates 12 months/caregiver estimates > 12 months (i.e., only patient has prognostic understanding)	21 (9.7%)		38.9%
Patient estimates > 12 months / caregiver estimates 12 months (i.e., only caregiver has prognostic understanding)	39 (18.1%)		31.6%

Table 3.

Multiple logistic regression model for DNR order completion by patient, caregiver, and combined patient and caregiver prognostic understanding/life expectancy estimate (N =279 dyads).

Predictor	Model Parameter Estimates		
	AOR of DNR	95% CI	p
Age	1.01	.98, 1.04	.60
Race	.39	.10, 1.47	.17
Gender	1.57	.78, 3.15	.21
Education	1.49	.70, 3.18	.30
Insurance	.73	.24, 2.22	.58
Performance status	.99	.97, 1.01	.20
Patient has prognostic understanding	.88	.23, 3.26	.84
Caregiver has prognostic understanding	.65	.24, 1.78	.40
Interactive effect of both patient and caregiver having prognostic understanding	5.89	1.11, 31.15	.04

Abbreviations: AOR = adjusted odds ratio (OR adjusted for all other covariates and variables included in the model); 95% CI = 95% confidence interval; DNR = do not resuscitate

Note: Prognostic understanding defined as life expectancy estimate < 12 months.