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Provider and Patient Gender Influence on Timing of Do-Not-Resuscitate Orders in Hospitalized Patients with Cancer

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Abstract

Background: End-of-life decisions and advance directives require timely physician–patient discussions but barriers exist to these discussions.
Objective: To evaluate the influence of physician and patient gender on the timing of inpatient do-not-resuscitate (DNR) orders.
Design: Retrospective cohort study.
Setting/Subjects: All adult patients (≥18 years) with cancer who received inpatient DNR orders at The University of Texas MD Anderson Cancer Center between January 2011 and December 2013.
Measurements: Gender interaction between physicians and patients towards timing of the DNR order.
Results: We identified 4,157 unique patients with a cancer diagnosis. These patients were treated by 353 physicians, of whom 123 (34.8%) were females and 230 (65.2%) were males. Multivariate analysis showed female patients were 1.3 times more likely to have early DNR orders written during hospital admission than were male patients (odds ratio [OR] 1.27; 95% confidence interval [CI] 1.07–1.50). When comparing gender interaction between physicians and patients, our results showed that female physicians were 1.5 times more likely to write early DNR orders with their female patients than for their male patients (OR, 1.48; 95% CI, 1.13–1.94). Same gender physician–patient dyads were not found between male physician and their patients (OR, 1.09; 95% CI, 0.91–1.31). Higher age, more comorbid conditions, and progression of diseases were also associated with early DNR orders (all $p < 0.01$).
Conclusion: Female patients are more likely to receive early DNR orders from their female physicians. Gender and gender interaction between physician and patients may potentially influence the timing of receiving DNR order.

Introduction

Advance directives, including do-not-resuscitate (DNR) orders, have been developed to assist with end-of-life decisions. Such directives make the participation of both health care providers and patients/family members vital in the care of patients at the end of life. Currently, it is widely recommended that advance directives for terminally ill patients, especially those with cancer, be timely and include discussions about disease prognosis, do-not-resuscitate (DNR) status, hospice options, and preferred site of death when considering quality of end-of-life care.[1–3] Studies have suggested that the timing of end-of-life discussions varies, and many patients receive DNR orders when death is imminent.[4,5]

Discussions about the end of life can be difficult for physicians as well as patients and their families. There are reported gender differences in communication and management of specific illnesses among physicians.[6–9] The gender of physicians and gender concordance between physicians and patients have been shown to influence preventive care practice, patient satisfaction, and quality of communication.[10–14] Female physicians engage in positive talk, build partnerships, and provide information related to biomedical and psychosocial topics more so than male physicians.[9] Likewise, studies on patient gender have found that female patients request more information than male patients.[15,16] Gender is also known to influence symptom reporting.[17,18] Although the findings of early studies are inconclusive, they suggest that gender, as the result

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of a sociocultural process, plays a part in the clinical decision making beyond the significance of biomedical differences associated with gender.

Gender differences are also reflected in end-of-life care. Studies have shown that women tend to express less desire for life-sustaining treatment and are more likely to receive DNR orders and use hospice services.[19–23] Women are also more easily able to initiate discussions concerning end of life, and female physicians spend more time talking to women.[9,24]

Despite the findings of early studies, few studies have examined the association between physician gender and patient gender and their effect on the timing of DNR orders. In this study, we sought to evaluate the impact of gender differences of both physicians and patients on timing of the DNR orders for patients who are terminally ill with cancer. Our hypothesis was that female physicians would be more likely to complete DNR orders earlier in the course of hospitalization than male physicians, and that the greatest amount of dyadic gender concordance would be seen between female physicians and female patients.

Methods

Subjects and data sources

With the approval of our Institutional Review Board and waiver of the requirement of informed consent, we performed a retrospective review of all adult hospitalized patients (≥18 years) with cancer who were treated at The University of Texas MD Anderson Cancer Center and received an inpatient DNR order between January 1, 2011 and December 31, 2013. In order to perform retrospective cohort analyses, we collected the following information: all written inpatient DNR orders; *International Classification of Disease, Ninth Revision* (*ICD-9-CM*) and Current Procedural Terminology codes from our inpatient and outpatient clinics and patient demographics, including age, gender, ethnicity, and comorbid conditions. We also collected the gender and specialty of the physicians who wrote the DNR orders. All information was collected from our Institutional Enterprise Informative Warehouse and Institutional Electronic Medical Record Order Set Repository Database.

Variable definitions

Disease characteristics. We used *ICD-9-CM*, malignant neoplasm (140–208), to identify the type of cancer within 2 years prior to each individual index date (DNR order date). We categorized cancers into either solid tumor primary or hematologic primary. For patients with two primary tumor sites present at admission, each was coded as a primary neoplasm. When treatment was directed primarily toward one neoplasm site, this malignancy was designated as the neoplasm closest to the time of DNR order.

Metastasis or metastatic disease (solid tumor). This was identified when a patient had three or more encounters with defined *ICD-9-CM* codes for metastatic disease in addition to a primary cancer diagnosis within 2 years prior to index date.

Comorbidity. Comorbidities were categorized using the Charlson Comorbidity Index method.[25] The Charlson Comorbidity Index is a scoring system that includes weighting factors on the basis of disease severity. Each comorbidity category has an associated weight, based on the adjusted risk of mortality or resource use, and the sum of all the weights results in a single comorbidity score for a patient. A score of zero indicates that no comorbidities were found. The higher the score, the more likely the predicted outcome will result in mortality or higher resource use. Since it was first published, the Charlson Comorbidity Index has been commonly used to measure patients' comorbid conditions. Comorbid conditions were identified from inpatient and outpatient files by specific ICD-9-CM codes at any time during the 12 months before the hospital admission. Cancer-related comorbidities were excluded from the Charlson Comorbidity Index calculation.

Timing of DNR order. For patients with more than one admission with a DNR order over the 3-year period, the first admission was selected. Furthermore, for admissions with more than one order written during the admission, the first DNR order was selected. We screened the first DNR order instead of the last because it reflected the timing more closely when physician and patient initiated discussions concerning end of life, as well as agreement on preferences to withhold resuscitation. The variable ''hospital day of DNR order,'' which designates the time when the first DNR order written, was divided into two groups: early DNR orders, defined as those with less than 5 days between hospital admission and the first DNR order, and late DNR orders, defined as those with 5 days or longer between hospital admission and the first DNR order. The low quartile of hospital length of stay (<5 days) was designed as a cutoff point for early or late DNR orders.

Statistical analysis

We performed all analyses based on physician gender. We used Pearson χ^2 tests to compare differences between categorical variables. We used the Student's t test to compare continuous variables between physician genders and the results were expressed as mean ± standard deviation (SD) whereas Mann-Whitney test used for comparing the median. To evaluate the potential effect of physician and patient gender on the timing of DNR orders, we developed a hierarchical logistic regression model using GLIMMIX (SAS Institute, Cary, NC) to control potential variation of hierarchical or clustered structures of data, such as patients nested or grouped within physicians. We included patient's age, gender, ethnicity, type of cancer (solid tumor versus hematologic malignancy), disease progression (nonmetastatic versus metastatic), Charlson Comorbidity Index, and physician's gender as predicator variables in the model. An interaction variable was included in the model to test for an interaction between physician's gender and patient's gender. We assigned unique physicians identification code that served as the nesting variable in our hierarchical regression model to account for the clustering of patients within physicians.

The binary outcome of the inpatient DNR order was defined as early DNR orders (<5 days) occurring during hospitalization. All two-sided $p < 0.05$ were considered statistically significant. Results of the multivariable analyses are expressed as adjusted odds ratios (OR) with their associated 95% confidence intervals (CI). All analyses were performed with SAS version 9.2 (SAS Institute).

Results

We identified 4,925 admissions of 4,170 unique patients with inpatient DNR orders between 2011 and 2013 at The University of Texas MD Anderson Cancer Center. Of those unique patients, 4,157 had a cancer diagnosis. These patients were treated by 353 physicians. Of the 353 physicians, 123 (34.8%) were females and 230 (65.2%) were males. The median number of patients per physician was 6.

Of the 4,157 unique patients with a cancer diagnosis, 1,111 (26.7%) had hematologic malignancies: 59.5% leukemia, 28.1% lymphoma, and 12.4% multiple myeloma. The other 3,046 patients (73.3%) had solid tumors: 8.0% colorectal, 10.4% breast, 18.3% lung, 4.8% head and neck, 3.4% cutaneous melanoma, 11.2% uterine, cervical, or ovarian, 3.1% prostate, and 40.8% other solid tumors. Most patients (90.4%) had a Charlson Comorbidity Index of 2 or higher.

The overall mean length of hospital stay was 12.7 days; the median length of stay was 8 days (interquartile range, 4–15 days). The overall mean time between hospital admission and the first DNR order was 7.9 days; the median time was 3.4 days (interquartile range, 1.5–8.5 days).

Table 1 compares the demographic and clinical characteristics of the patients of female physicians with those of patients of male physicians. Overall, compared with patients of male physicians, patients of female physicians were more likely to be female (55.1% versus 45.9%, $p < 0.01$); have uterine, cervical, or ovarian cancer (15.7% versus 8.2%, $p < 0.01$); and have solid tumors with metastatic disease (68.8% versus 60.2%, $p < 0.01$). There was also a statistically significant difference in the ethnicity of the patients between physician gender groups ($p < 0.01$), but this difference was small. There was no statistically significant difference in age group or Charlson Comorbidity Index between physician gender groups.

Table 2 shows the clinical course and outcome of the patients organized by physician gender. The length of hospital stay for patients of female physicians was 1.4 days less than for patients of male physicians ($p < 0.01$). Also, the mean hospital day on which the DNR order was written was significantly earlier for patients of female physicians than for patients of male physicians (7.0 days versus 8.4 days; $p < 0.01$). The median number of hospital days to DNR orders was similarly earlier for female physicians (2.7 days versus 3.5 day; $p < 0.01$).

Table 1. Characteristics of Adult Cancer Patients by Physician Gender

	Female physician		*Male physician*		
Characteristics	*No. patients*	*%*	*No. patients*	*%*	p
Gender					<0.01
Male	690	44.9	1,416	54.1	
Female	847	55.1	1,204	45.9	
Age, mean ± SD, y	60.0 ± 13.7		59.7 ± 14.2		0.307
Age group					0.870
<55 y	450	29.3	786	20.0	
55–64 y	490	31.9	804	30.7	
65–74 y	387	25.2	662	25.3	
≥75 y	210	13.6	368	14.0	
Ethnicity					<0.01
White	971	63.2	1,719	65.6	
African American	264	17.2	353	13.5	
Hispanic	212	13.8	362	13.8	
Other	90	5.9	186	7.1	
Site of solid cancer					<0.01
Colorectal	65	5.4	178	9.6	
Breast	160	13.4	158	8.6	
Lung	255	21.3	302	16.4	
Head and neck	53	4.4	94	5.1	
Melanoma of skin	22	1.8	80	4.3	
Uterine, cervical, and ovarian	188	15.7	152	8.2	
Prostate	36	3.0	59	3.2	
Other solid tumors	420	35.0	824	44.6	
Type of hematologic malignancy					0.340
Leukemia	200	59.2	461	59.6	
Lymphoma	88	26.0	224	29.0	
Multiple myeloma	50	14.8	88	11.4	
Progression of cancer					<0.01
Solid tumor without metastasis	65	9.2	269	10.3	
Solid Tumor with metastasis	1,058	68.8	1,578	60.2	
Hematologic malignancy	338	22.0	773	29.5	
Charlson Comorbidities					0.813
0 or 1	147	9.6	253	9.7	
2	672	43.7	1,120	42.8	
3	669	43.5	1,150	43.9	
≥4	49	3.2	97	3.7	

Table 2. Clinical Course and Outcome of Adult Cancer Patients by Physician Gender

Patient outcome	*Female physician*	*Male physician*	p
Number of patients	2,051	2,106	
Hospital length of stay			
Mean ± SD	11.8 ± 14.5	13.2 ± 17.0	<0.01
Median, interquartile range	7.0, 4.0–13.0	8.0, 4.0–15.0	
Days of DNR order occurred, day			
Mean ± SD	7.0 ± 12.5	8.4 ± 14.8	<0.01
Median, interquartile range	2.7, 1.4–7.5	3.5, 1.5–8.7	
Early DNR order,[a] *n* (%)	1,006 (65.4)	1,604 (61.2)	<0.01
Mortality,[b] *n* (%)	560 (36.4)	973 (37.1)	0.281

[a]Less than 5 days.
[b]Died in hospital.
SD, standard deviation; DNR, do-not-resuscitate.

Table 3 shows the adjusted odds ratios for early inpatient DNR orders based on multivariable regression model adjusted for clustering within physicians as well as patient and physician characteristics, including patient's gender, age, ethnicity, progression of cancer disease, number of comorbid conditions, physician's gender, and interaction term between physician gender and patient gender. Our results showed that that female patients were 1.3 times more likely to have early DNR orders written during hospital admission than were male patients (OR, 1.27; 95% CI, 1.07–1.58). When comparing with male physicians, the female physicians did not appear to have an effect on the timing of the DNR order (OR, 0.97; 95% CI, 0.76–1.20). However, when comparing gender interaction between physicians and patients, our results showed that female physicians were 1.5 times more likely to write early DNR orders with their female patients than their male patients (OR, 1.48; 95% CI, 1.13–1.94). Same-gender physician–patient dyads were not found between male physician and their patients (OR, 1.09; 95% CI, 0.91–1.31).

Patients with hematologic malignancies had longer hospital times before a DNR order was issued than did patients who had solid tumors without metastatic disease. Specifically, compared with patients who had solid tumors without metastatic disease, patients who had hematologic malignancies were 4.8 times less likely to have an early DNR order (OR, 0.21; 95% CI, 0.11–0.38), whereas patients who had solid tumors with metastatic disease were 1.4 times more likely to have an early DNR (OR, 1.39; 95% CI, 1.06–1.82).

For Charlson Comorbidity Index, a score of zero indicates that no comorbidities were found. The higher the score, the more likely the predicted outcome will result in mortality or higher resource use. In this study, early DNR orders were more likely in patients with Charlson Commodity Index equal to 2 (OR, 1.66; 95% CI, 1.23–2.24), equal to 3 (OR, 1.77; 95% CI, 1.30–2.41), or ≥4 (OR, 2.74; 95% CI, 1.55–4.84) than for patients with Charlson indexes less than or equal to 1. Older age group was also associated with early DNR orders, patients who were 75 years older were 1.4 times more likely to have early DNR orders than for those patients younger than 55 years (OR, 1.41; 95% CI, 1.09 to 1.84).

Table 3. Adjusted Odds Ratio for Early Do-Not-Resuscitate Order (<5 days) by Physician Gender

Patient characteristics	*OR*	*95% CI*	p
Physician gender			
Male	Reference		
Female	0.97	0.76–1.20	0.2449
Patient gender			
Male	Reference		
Female	1.27	1.07–1.50	0.006
Gender interaction			
Male physician*male patient	Reference		
Male physician*female patient	1.09	0.91–1.31	0.361
Female physician*male patient	Reference		
Female physician*female patient	1.48	1.13–1.94	0.006
Age group			
<55 y	Reference		
55–64 y	1.19	0.97–1.44	0.0824
65–74 y	1.20	0.98–1.48	0.0807
≥75 y	1.41	1.09–1.84	0.0117
Ethnicity			
White	Reference		
African American	1.11	0.82–1.50	0.488
Hispanic	1.01	0.81–1.25	0.963
Other	1.06	0.86–1.31	0.581
Progression of cancer			
Solid tumor without metastatic	Reference		
Solid tumor with metastatic	1.39	1.06–1.82	0.017
Hematologic malignance	0.21	0.11–0.38	0.001
Charlson Comorbidity Index			
0 or 1	Reference		
2	1.66	1.23–2.24	0.002
3	1.77	1.30–2.41	0.001
≥4	2.74	1.55–4.84	0.001

OR, odds ratio; CI, confidence interval.

Discussion

In this study, we hypothesized that female physicians would be more likely to complete DNR orders earlier than male physicians and the greatest amount of dyadic gender concordance would be seen between female physicians and female patients. Our results supported our hypothesis and suggested that the female physicians were more likely to write an early DNR orders with their female patients.

Our results expands on findings of early studies indicating that physicians' gender influenced their clinical practices.[19–23,26–31] In general, female patients had more open communication styles and greater ease discussing the issues surrounding death; male patients, on the other hand, need more prompting to initiate such discussion.[32] Female physicians tend to engage in more discussions addressing psychosocial issues through counseling,

emotional and positive talk, being better listeners, and enlistment of patient input than male physicians.[33] It is also suggested that that patient behavior reciprocates gender-linked physician behavior, which may also lead to a more open communication style in both male and female patients of a female physician.[34]

The decision to initiate a DNR order can be influenced by many factors, including the severity of the disease, the patient's functional status, and social and cultural factors. As the population ages and comorbidities become more prevalent, it is not surprising that age and comorbidities are independent predicators for DNR status.[35–37] Studies have revealed that older patients with multiple comorbidities are less likely than young patients to accept aggressive treatment or care focused on life extension.[38] In our analysis, we observed variations in early DNR status by patient age and comorbidities. Patients with higher age and patients with a high number of 4 or more Charlson Comorbidity Index were more likely to receive earlier DNR orders.

With increasing knowledge and awareness about sex and gender differences in biomedical and sociocultural fields, the discipline of sex- and gender-specific medicine has begun to play a role.[39] As the future of clinical practice is oriented toward individualized patient care, health care providers can start to identify how women and men differ in their preferences about life-sustaining care. Understanding these differences may help guide providers toward more gender-specific care. Health care providers should be prepared and trained in how to integrate such knowledge into their practices, as such integration is strongly indicated by the 2010 Institute of Medicine report.[40]

In this study, we were interested in the time DNR orders were placed and we did not aim to assess physician differences between completions of DNR versus no DNR at all. In interpreting our findings, it is important to acknowledge several potential methodological limitations. First, although we adjusted for severity of illness and other factors such as age, gender, and ethnicity, our results may be confounded by unmeasured patient factors such as functional status, cognition, and social support. Second, we could not assess patients' underlying beliefs or adjust for physicians' attitudes toward end-of-life care. Third, we were unable to gather information about the extent of communication between physicians and patients when DNRs were obtained. Fourth, we did not include information such as physicians' age and year of medical school graduation as potential confounding factors. Finally, this study only measures the cross-sectional effect of physician and patient gender on the timing of inpatient DNR orders from a single comprehensive cancer center setting caring only for patients with cancer, hence caution should be taken when generalizing findings. However, the results of our study do elucidate possible gender differences that could influence the level of care received by our patients with cancer during the end-of-life decision-making process.

The implications of the results of our study are limited without more focused real-time behavioral observation of patient–physician interactions when obtaining DNR orders. However, our results indicate there are possible gender differences that may potentially influence the patient's decision to request a DNR order.

In summary, the results of our exploratory study suggest that physicians' gender and gender interaction between physicians and patients may influence the timing of DNR orders. The revealed effect of gender on DNR orders may help guide physician communication training and facilitate best practices of care in a more personalized approach toward our patients. Health care providers should be aware of how gender affects the delivery of medical services in order to minimize the gap in the quality of care provided.

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Author Disclosure Statement

No competing financial interest exists.

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