Association between Do Not Resuscitate/Do Not Intubate Status and Resident Physician Decision-making

A National Survey

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Abstract

Rationale: Compared with their Full Code counterparts, patients with do not resuscitate/do not intubate (DNR/DNI) status receive fewer interventions and have higher mortality than predicted by clinical characteristics.

Objectives: To assess whether internal medicine residents, the front-line providers for many hospitalized patients, would manage hypothetical patients differently based on code status. We hypothesized respondents would be less likely to provide a variety of interventions to DNR/DNI patients than to Full Code patients.

Methods: Cross-sectional, randomized survey of U.S. internal medicine residents. We created two versions of an internet survey, each containing four clinical vignettes followed by questions regarding possible interventions; the versions were identical except for varying code status of the vignettes. Residency programs were randomly allocated between the two versions.

Results: Five hundred thirty-three residents responded to the survey. As determined by Chi-squared and Fisher's exact test, decisions to intubate or perform cardiopulmonary resuscitation were largely dictated by patient code status (>94% if Full Code, <5% if DNR/DNI; $P < 0.0001$ for all scenarios). Resident proclivity to deliver noninvasive interventions (e.g., blood cultures, medications, imaging) was uniformly high (>90%) and unaffected by code status. However, decisions to pursue other aggressive or invasive options (e.g., dialysis, bronchoscopy, surgical consultation, transfer to intensive care unit) differed significantly based on code status in most vignettes.

Conclusions: Residents appear to assume that patients who would refuse cardiopulmonary resuscitation would prefer not to receive other interventions. Without explicit clarification of the patient's goals of care, potentially beneficial care may be withheld against the patient's wishes.

Keywords: DNR/DNI; clinician decision-making; effect of code status

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With more attention paid to implementing advance directives in an aging population, orders to limit life-sustaining treatment are becoming increasingly common in both inpatient and outpatient settings (1). During

hospitalizations, patients are assigned a "code status" to indicate whether or not they would want to receive cardiopulmonary resuscitation (CPR) in the event of cardiac arrest. Strictly defined, a do not resuscitate/

do not intubate (DNR/DNI) status indicates a patient does not want to receive CPR or intubation in the event of cardiopulmonary arrest. For patients without a DNR/DNI status, the default code status in the United

States is “Full Code,” meaning the patient will receive CPR and intubation if medically indicated.

However, the nuances of how physicians interpret DNR/DNI orders, and how they affect the care delivered to hospitalized patients, are not well understood. Two single-center physician surveys conducted more than a decade ago revealed large variation in interpretation of the scope of DNR/DNI orders (2, 3). On the basis of responses to clinical vignettes, physicians were more likely to withhold a wide spectrum of care from patients with a DNR or DNI order (compared with Full Code patients), ranging from intravenous fluid administration (2) to transfer to an intensive care unit (3). Several studies have demonstrated that patients with a DNR/DNI order may receive less aggressive care unrelated to CPR (4–8) and have higher in-hospital (9, 10), 60-day (11), and 6-month (12) mortality than their Full Code counterparts, even after adjustment for clinical characteristics that portend a poor prognosis.

Analyzing how healthcare providers interpret DNR/DNI status is a critical step in understanding the wide variation in healthcare use at the end of life (13). Previous work has focused on the practices of attending physicians; no study has surveyed a national sample of resident physicians. Studying practice patterns among resident physicians is particularly salient, given that residents are the front-line of providers during many hospitalizations, but often lack experience with the nuances of end-of-life care. We conducted a national, randomized survey of internal medicine residents to determine whether a patient's decision to defer CPR (as signified by a DNR/DNI status) would result in a different pattern of delivery of interventions unrelated to CPR. We hypothesized that residents presented with identical clinical vignettes would be more likely to withhold interventions unrelated to CPR for hypothetical patients with a DNR/DNI status compared with a Full Code status, particularly for aggressive or invasive interventions.

Methods

Survey Development

We designed a survey instrument that presented four clinical vignettes involving patients hospitalized with serious illness.

Three of the vignettes were modifications of previously published scenarios (3), and the fourth was developed de novo by the authors. Each vignette was followed by 10 treatment decisions.

We offered a variety of potential interventions that ranged from noninvasive (computed tomography scans, oxygen and intravenous fluid administration, blood cultures, initiation of anticoagulation) to therapies that may be perceived as more invasive (central venous catheter placement, bone marrow biopsy, esophagogastroduodenoscopy, colonoscopy, bronchoscopy, dialysis, surgery consultation). Five of the decisions were common to all vignettes (central venous catheter placement, discussion of goals of care, transfer to an intensive care unit [ICU], endotracheal intubation, CPR), whereas the other five decisions represented diagnostic and/or treatment interventions specific to the clinical scenario described in each vignette.

Respondents used a 4-point Likert scale (strongly agree to strongly disagree) to indicate whether they would choose to provide each intervention if they were caring for the patient in the vignette. The survey also asked respondents basic demographic data about themselves and their training program.

We created two versions of the survey (A and B). Each version included the same four clinical vignettes, differing only in the code status (Full Code or DNR/DNI) assigned to each vignette. Each version

included 2 vignettes with Full Code status and 2 with DNR/DNI status (Table 1).

To improve clarity of the survey, we sought feedback from 10 critical care physicians at Boston Medical Center on the face validity of the vignettes and proposed interventions, and revised our survey in response to their feedback. We then pilot tested the revised survey with 30 internal medicine residents from Boston Medical Center for comprehension and clarity, and again revised the survey in response to feedback.

Study Population

Eligible participants included internal medicine residents enrolled in one of the 391 accredited allopathic internal medicine residency programs in the United States, based on the 2013 Fellowship and Residency Electronic Interactive Database maintained by the American Medical Association.

Survey Administration

We conducted a self-administered, anonymous internet survey (SurveyMonkey, Palo Alto, CA). Between October 2013 and May 2014, we emailed all US internal medicine residency program directors, requesting that they forward an invitation and link to our web-based survey to residents currently enrolled in their training program. We randomly allocated residency programs based on the first letter of the program director's last name to receive a link to Survey A (195 programs) or Survey B (196 programs). Repeat email

Table 1. Summary of clinical vignettes and code status in the two versions of the survey

Case description	Code Status	
	Survey Version A	Survey Version B
Vignette 1: 72-year-old man with multiple myeloma and dementia, admitted from nursing home with sudden change in mental status	DNR/DNI	Full Code
Vignette 2: 34-year-old man with AIDS, admitted with presumed recurrent <i>Pneumocystis pneumonia</i>	Full Code	DNR/DNI
Vignette 3: 48-year-old woman with likely metastatic breast cancer, admitted with postobstructive pneumonia	DNR/DNI	Full Code
Vignette 4: 80-year-old woman recently treated as an outpatient for community acquired pneumonia, admitted with <i>Clostridium difficile</i> infection	Full Code	DNR/DNI

Definition of abbreviations: DNR/DNI = do not resuscitate/do not intubate

invitations were sent to program directors 2 and 6 weeks after the first email. Program directors were given the opportunity to opt out of our survey and not receive future emails. Survey participation was voluntary, and no incentives were provided for survey completion. This research was deemed exempt from review by the Institutional Review Board at the Boston University School of Medicine.

Statistical Analysis

For each vignette, we used Chi-squared or Fisher's exact test, as appropriate, to compare the proportion of internal medicine residents who would provide each intervention according to the code status assigned to the vignette (e.g., for vignette 1, full code status [Survey A] vs. DNR/DNI status [Survey B]). Because we performed multiple comparisons (10 per vignette, 40 total), we used the Bonferroni method to reduce the possibility of finding statistical significance by chance, and therefore considered the threshold for statistical significance to be $P < 0.00125$. For the analyses of likelihood of transfer to ICU, we excluded residents who reported a hospital policy of only admitting Full Code patients to the ICU. All analyses were conducted in SAS 9.3 (Cary, NC).

Results

A total of 553 resident physicians responded to our survey (304 to version A and 249 to version B). The majority of respondents were between 25 and 35 years of age, with equal sex representation. Respondents included residents in postgraduate years 1–4 (39% were postgraduate year 1/interns) with diverse career plans and represented residency programs with a wide range of affiliated hospital types, program sizes, and geographic distribution. Respondent characteristics were similar for the two versions of the survey (Table 2). Five residency program directors specifically declined to invite their residents to participate in our survey.

As shown in Table 3, patient code status strongly influenced resident decisions to intubate (range of intubation rates across vignettes: 1.1–3.6% for DNR/DNI vs. 94–99% for Full Code; $P < 0.00125$ in all scenarios) or perform CPR (0.7–4.1% for DNR/DNI vs. 94–98% for Full Code; $P < 0.00125$ in all scenarios). Across all

Table 2. Respondent characteristics

	Survey A (N=304), n (%)	Survey B (N=249), n (%)
Resident characteristics		
Age, yr		
<25	3 (<1)	3 (1)
25–35	284 (93)	224 (90)
>35	16 (5)	20 (8)
Female sex	154 (51)	115 (46)
Race/ethnicity		
Caucasian	158 (52)	131 (53)
African-American	9 (3)	6 (2)
Hispanic or Latino	14 (5)	16 (6)
Asian or Pacific Islander	74 (24)	57 (23)
Other	40 (13)	23 (9)
Postgraduate year		
1	129 (42)	88 (35)
2–3	162 (53)	148 (59)
4 or above	13 (4)	11 (4)
Prior intensive care unit rotation	275 (90)	228 (92)
Career plans		
Primary care	35 (12)	33 (13)
Hospitalist	45 (15)	44 (18)
Subspecialty	182 (60)	149 (60)
Combined practice	23 (8)	15 (6)
Other (not internal medicine)	17 (6)	8 (3)
Residency program characteristics		
Geographic location		
Northeast	157 (52)	96 (39)
Midwest	65 (21)	48 (19)
South	46 (15)	38 (15)
West	23 (8)	58 (23)
Other*	10 (3)	8 (3)
Class size		
<10	33 (11)	29 (12)
10–30	216 (71)	147 (59)
>30	52 (17)	71 (29)
Main teaching hospital type		
University hospital	151 (50)	163 (65)
Community hospital, university affiliated	98 (32)	59 (24)
Community hospital	47 (15)	21 (8)
Other	6 (2)	4 (2)
Hospital requires intensive care unit admissions to be Full Code	16 (5)	27 (11)

*Hawaii, or not specified.

vignettes, the vast majority (95–99%) of residents indicated a willingness to discuss goals of care with the patient and/or family, regardless of code status. However, in all vignettes, the decision to initiate ICU transfer was significantly less frequent for patients with a status of DNR/DNI compared with Full Code, even after excluding respondents who indicated their hospital did not admit patients with DNR/DNI status to the ICU ($n = 43$: 16 respondents to Survey A and 27 respondents to Survey B). In contrast, decisions to pursue noninvasive diagnostic or therapeutic interventions (CT scans, administration of oxygen or intravenous

fluids, blood cultures, initiation of anticoagulation) did not significantly differ by patient code status, with high levels of use across all vignettes.

Resident decisions to offer invasive procedures differed based on the clinical scenario. As shown in Table 3, in most vignettes (1, 2, and 4), residents were significantly less likely to indicate they would provide invasive procedures (including central venous catheter placement, esophagogastroduodenoscopy, colonoscopy, bronchoscopy, dialysis, surgery consultation) to patients who had a status of DNR/DNI compared with Full Code. The exceptions were lumbar

Table 3. Responses to clinical vignettes

Vignette	Intervention	Residents who would provide intervention, %		
		Full code	Do not resuscitate/ do not intubate	P Value
Vignette 1: 72-year-old man with advanced multiple myeloma and dementia admitted with sudden change in mental status	Upper endoscopy (if hematemesis and drop in hematocrit)	91.9	85.3	0.02
	Central venous catheter placement (if peripheral intravenous line unobtainable)	95.3	86	0.0004*
	Transfer to intensive care unit (if hypotensive unresponsive to fluid challenge) [†]	95.3	59.1	<0.0001*
	Dialysis (if develops renal failure, anuria, acidemia)	72.1	38.4	<0.0001*
	Computed tomography scan of head (to evaluate change in mental status)	94.4	92.8	0.46
	Lumbar puncture (if fever and leukocytosis)	85.9	82.9	0.35
	Draw blood cultures (if fever to 104°F)	99.6	97.5	0.08
	Discuss goals of care with patient/family (if clinical decline)	98.7	97.5	0.36
	Endotracheal intubation (if respiratory arrest)	94.4	1.1	<0.0001*
	Initiate cardiopulmonary resuscitation (if found pulseless)	95.3	0.7	<0.0001*
Vignette 2: 34-year-old man with advanced AIDS admitted with presumed recurrent <i>Pneumocystis</i> pneumonia	Diagnostic bronchoscopy (if fails to clinically improve)	95.2	85.2	0.0001*
	Bone marrow biopsy (if pancytopenic)	77.0	64.2	0.0016
	Central venous catheter placement (if peripheral intravenous line unobtainable)	100	90.4	<0.0001*
	Transfer to intensive care unit (if hypotension unresponsive to fluid challenge) [†]	99.2	82.1	<0.0001*
	Surgery consult (if protracted vomiting and abdominal X-ray shows obstruction)	98.2	90.8	0.0002*
	Discuss goals of care with patient/family (if clinical decline)	95.6	97.8	0.17
	Oxygen therapy (if increasingly hypoxic)	100	99.6	0.46
	Draw blood cultures (if fever to 104°F)	99.6	98.2	0.18
	Intubate (if respiratory arrest)	97.0	2.6	<0.0001*
	Initiate cardiopulmonary resuscitation (if found pulseless)	97.8	3.1	<0.0001*
Vignette 3: 48-year-old woman with metastatic breast cancer, presenting with cough and shortness of breath, found to have postobstructive pneumonia	Central venous catheter placement (if peripheral intravenous line unobtainable)	98.2	92.7	0.005
	Transfer to intensive care unit (if hypotension unresponsive to fluid challenge) [†]	98.0	73.4	<0.0001*
	Noninvasive ventilation (if increased work of breathing and respiratory acidosis)	97.3	96.6	0.65
	Diagnostic thoracentesis (if large right pleural effusion)	96.4	94.2	0.27
	Discuss goals of care with patient/family (if progression of cancer)	99.1	98.9	1.00
	Initiate anticoagulation (if develops deep venous thrombosis)	97.7	97.3	0.77
	Colonoscopy (if rectal bleeding and significant hematocrit drop)	90.0	86.5	0.24
	Inferior vena cava filter placement (if anticoagulation contraindicated)	83.6	80.8	0.43
	Intubate (if respiratory arrest)	98.6	1.9	<0.0001*
	Initiate cardiopulmonary resuscitation (if found pulseless)	97.7	1.9	<0.0001*
Vignette 4: 80-year-old woman with hyperlipidemia, recent pneumonia, admitted with <i>Clostridium difficile</i> infection	Dialysis (if develops renal failure, anuria, acidemia)	89.8	75.0	<0.0001*
	Central venous catheter placement (if peripheral intravenous line unobtainable)	99.6	96.8	0.03
	Transfer to intensive care unit (if hypotension unresponsive to fluid challenge) [†]	99.6	84.4	<0.0001
	Surgery consult (if septic shock related to <i>C. difficile</i> colitis)	89.1	77.7	0.0008*
	Draw blood cultures (if fever to 104°F)	100.0	99.5	0.46
	Intravenous fluids (if clinically volume depleted)	100.0	99.6	0.46
	Abdominal computed tomography (if worsening abdominal pain, rectal bleeding)	99.2	97.7	0.26
	Discuss goals of care with patient/family (if clinical decline)	97.7	98.6	0.52
	Intubate (if respiratory arrest)	95.3	3.6	<0.0001*
	Initiate cardiopulmonary resuscitation (if found pulseless)	94.2	4.1	<0.0001*

*Statistically significant result at threshold of $P < 0.00125$.[†]Respondents who indicated that their hospital did not accept do not resuscitate/do not intubate patients to the internal care unit were excluded.

puncture in vignette 1 and bone marrow biopsy in vignette 2, which residents were equally likely to perform regardless of code

status. In contrast, the majority of residents indicated they would perform aggressive or invasive procedures (including central

venous catheter placement, thoracentesis, inferior vena cava filter placement, colonoscopy, and noninvasive ventilation

[NIV]) to the 48-year-old woman with metastatic breast cancer described in vignette 3, regardless of code status.

Discussion

In a randomized survey of US internal medicine resident physicians, we identified substantial differences in clinical care decisions for identical patients, solely based on code status. Specifically, DNR/DNI patients were less likely to receive many invasive procedures, surgical consultations, or transfer to the ICU. In contrast, we did not find differences by code status for noninvasive studies or therapies. Our findings confirm our hypothesis that many resident physicians interpret a DNR/DNI order as limiting invasive or aggressive interventions beyond CPR and endotracheal intubation. Absent additional information, decisions to withhold many types of care not specified in DNR/DNI orders is concerning, given that the majority of patients with a DNR/DNI status in registry studies indicated they would accept other interventions beyond CPR and intubation (14, 15).

Although we are unaware of prior multicenter studies of resident physicians, two previous single center surveys have indicated that physicians may limit interventions beyond CPR or endotracheal intubation for patients with a DNR/DNI order (2, 3). Moreover, observational studies of actual care received have validated the pattern observed in our study and the previous surveys: patients with a DNR/DNI status are less likely to receive interventions unrelated to CPR (4–8, 16, 17). In many cases, withholding these interventions results in a lower quality of care delivered to DNR/DNI patients than to Full Code patients. Examples include a decreased likelihood of initial hospitalization for pneumonia (4), failure to perform specific standard of care diagnostic and therapeutic interventions (e.g., blood transfusion, echocardiography for heart failure, central venous catheter placement for septic shock) (5, 6, 16), lack of administration of guideline-concordant medications (e.g., beta-blockers for acute myocardial infarction, angiotensin-converting enzyme inhibitors for heart failure, aspirin after stroke) (5, 7, 17), and lack of transfer to ICU or specialized stroke unit in the instance of worsening clinical status (7, 8).

Despite these concerning patterns, when compared with previous surveys, respondents to our survey were more willing than physicians in prior years to provide numerous interventions to DNR/DNI patients, including transfer to ICU (9% in 1988, 38% in 1997, 73% in current study), dialysis (14% in 1988, 9% in 1997, 57% in current study), and surgical consultation (25% in 1988, 50% in 1997, 84% in current study) (2, 3). Several possibilities might explain this finding. First, resident physicians may be less comfortable withholding interventions from DNR/DNI patients than more experienced clinicians (who made up the majority of respondents in prior surveys). Alternatively, the increasing willingness to offer both invasive and noninvasive interventions to DNR/DNI patients may reflect a larger societal trend toward provision of more aggressive care at the end of life than in prior years (18, 19), a trend that may continue, given that the resident physicians in our study are the healthcare providers of the future. Over time, there has been a societal trend toward less paternalism among physicians, and delivery of more patient-centered care (20), and it is reassuring that in every vignette, virtually all residents indicated a willingness to engage in discussions with patients about their goals of care.

Nonetheless, we did observe differences in proclivity to offer aggressive interventions among clinical scenarios that may reflect biases. In both the scenarios describing older patients (vignettes 1 and 4), residents were less likely to offer invasive interventions to DNR/DNI patients. For example, vignette 4 describes an apparently healthy 80-year-old woman without comorbid disease suffering an acute medical illness who may recover with appropriate treatment. Similarly, it was striking that residents were markedly less willing to provide interventions based on DNR/DNI status to the young man with AIDS described in vignette 2 than to the young woman with metastatic breast cancer described in vignette 3. Thus, value judgements regarding the age of the patient or the disease process may also have contributed to resident decision-making in these vignettes.

Respondent choices for NIV and surgery consultation deserve further discussion, as responses to these scenarios represent decisions at odds with evidence-based care. In vignette 3, more than 96%

of residents elected to enact NIV for the young woman with metastatic breast cancer and postobstructive pneumonia, regardless of patient code status. Yet, in this clinical setting, it is unclear whether NIV is effective for palliation of respiratory distress (21), reducing the need for intubation, or short-term mortality (22, 23), and guidelines state there is insufficient evidence to recommend NIV for acute respiratory failure caused by pneumonia (24). Possible explanations for the enthusiastic use of NIV include lack of respondent knowledge regarding indications for NIV, perception that this therapy is easy to initiate or discontinue, or desire to offer palliation of dyspnea.

In both vignettes offering surgical consultation (vignette 2, a 34-year-old man with AIDS and pneumocystis jiroveci pneumonia who develops a bowel obstruction, and vignette 4, an 80-year-old woman with septic shock secondary to *Clostridium difficile* infection), respondents were significantly less likely to pursue consult when the patient was DNR/DNI. As both a bowel obstruction and septic shock secondary to *Clostridium difficile* infection are indications for surgery (25, 26), the relative reluctance to consult surgery may indicate an assumption by residents that the scope of a DNR/DNI order may contraindicate endotracheal intubation for general anesthesia or an assumption that DNR/DNI patients would prefer not to receive aggressive interventions such as surgery. This assumption may not always be valid: a recent qualitative study found that several patients who expressed a desire to avoid CPR in the event of cardiac arrest would nonetheless accept high-risk surgical procedures (27).

Strengths and Limitations

Our study has several strengths. It is the first national survey to evaluate how patient code status may influence management decisions of internal medicine residents. We supply national data from respondents who were diverse with respect to geographic location, level of training, type of training program, and career aspirations. Our random allocation of surveys describing identical clinical vignettes that differed only by code status allowed us to isolate the effect of code status on resident decision-making, a level of experimental control that would not be possible with other study designs.

Our study also has limitations. Patients were hypothetical, and our respondents were unable to clarify patient wishes beyond the instructions provided with the survey. Therefore, our study reflects a theoretical effect on physician practice; however, responses to clinical vignettes have been shown to correlate with actual practice and quality of care delivery (28, 29).

Because our survey was anonymous, we could not determine the residency program of individual survey respondents. Thus, we could not statistically account for correlated responses within residency programs. As a result, some of the statistical differences in treatments provided based on code status may be overestimated, as it is highly likely that residents from the same program may behave similarly because of a shared culture and training experience.

We cannot determine the extent to which our respondents represent those who did not respond. Although we received more than 500 responses to our survey from residents across the country, this is only a small fraction of the population of US internal medicine residents (approximately 2%), and we cannot be confident that our respondents reflect the opinions or practices of other residents. We are unable to calculate a response rate, as we lack information on the denominator of how many residents received our survey; we do not know how many program directors received and opened our email invitation, or forwarded

it to residents. Although five residency programs replied to our survey and declined to participate, many more may have simply elected not to forward our email invitation to their residents without providing us notice.

Implications for Practice and Future Research

Our study highlights the limitations of relying on code status alone to guide medical decision-making; in the absence of more explicit clarification of the patient's goals of care, potentially beneficial care may be withheld against the patient's wishes, or conversely, residents may deliver interventions that DNR/DNI patients would not actually want to receive. Further research is warranted to determine how to better align care delivered with patient wishes.

Although not directly tested in our study, advance directives such as the Physician Orders for Life-Sustaining Treatment form (30) or the Canadian Goals of Care Designations form (31) that allow patients to specify their goals of care and the types of interventions they would wish to receive may be a better solution than the less informative code status in common use (32, 33).

Although the ideal approach would be to have more comprehensive discussion and documentation of patients' goals of care in the outpatient setting, realistically,

many patients will neither have had such discussions nor completed advance directives before hospitalization (34). Other alternatives include improving medical resident education in end-of-life decision-making. For example, prior work suggests that adding directed ethics education, concrete training in end-of-life decision-making, and/or simulation of goals-of-care discussions to the residency experience each may help to provide more balanced, appropriate care to all patients, regardless of code status (35–38).

Conclusions

In this national survey, we found that in a variety of clinical scenarios, internal medicine resident physicians would provide different care to patients with DNR/DNI orders, outside of limitations on CPR or intubation for mechanical ventilation. Our results suggest that residents make assumptions that patients who would refuse CPR would also prefer not to receive other invasive therapeutic interventions. Although resident physicians seem more likely to pursue many interventions for DNR/DNI patients than physicians in past studies, a different standard of care remains for patients who elect a DNR/DNI status. ■

Author disclosures are available with the text of this article at www.atsjournals.org.

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