Would Physicians Override a Do-Not-Resuscitate Order When a Cardiac Arrest Is Iatrogenic?

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OBJECTIVE: **To assess whether physicians would be more likely to override a do-not-resuscitate (DNR) order when a hypothetical cardiac arrest is iatrogenic.**

DESIGN: **Mailed survey of 358 practicing physicians.**

SETTING: **A university-affiliated community teaching hospital.**

PARTICIPANTS: **Of 358 physicians surveyed, 285 (80%) responded.**

MEASUREMENTS AND MAIN RESULTS: **Each survey included three case descriptions in which a patient negotiates a DNR order, and then suffers a cardiac arrest. The arrests were caused by the patient's underlying disease, by an unexpected complication of treatment, and by the physician's error. Physicians were asked to rate the likelihood that they would attempt cardiopulmonary resuscitation for each case description. Physicians indicated that they would be unlikely to override a DNR order when the arrest was caused by the patient's underlying disease (mean score 2.55 on a scale from 1 "certainly would not" to 7 "certainly would"). Physicians reported they would be much more likely to resuscitate when the arrest was due to a complication of treatment (5.24 vs 2.55; difference 95% confidence interval [CI] 2.44, 2.91; $p <$ .001), and that they would be even more likely to resuscitate when the arrest was due to physician error (6.32 vs 5.24; difference 95% CI 0.88, 1.20; $p <$ .001). Eight percent, 29%, and 69% of physicians, respectively, said that they "certainly would" resuscitate in these three vignettes ($p <$ .001).**

CONCLUSIONS: **Physicians may believe that DNR orders do not apply to iatrogenic cardiac arrests and that patients do not consider the possibility of an iatrogenic arrest when they negotiate a DNR order. Physicians may also believe that there is a greater obligation to treat when an illness is iatrogenic, and particularly when an illness results from the physician's error. This response to iatrogenic cardiac arrests, and its possible generalization to other iatrogenic complications, deserves further consideration and discussion.**

KEY WORDS: **do-not-resuscitate orders; cardiac arrest, iatrogenic; physician decision to treat; error.**
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Despite recent advances in medical diagnosis and treatment, serious iatrogenic illness may occur in 4% to 17% of hospitalized patients.[1–5] Research has provided a better understanding of the epidemiology of complications and errors,[3,4,6,7] and explored physicians' psychological responses to their mistakes.[8–11] It is less clear how, or whether, physicians' treatment decisions differ after a patient experiences an iatrogenic event.

A 1997 ethical analysis suggested that an iatrogenic cause for an illness does not make it permissible to override a patient's prior refusal of treatment.[12] The authors suggested that neither the admonition to "do no harm," nor the probability of success justifies overriding an autonomous patient's refusal of treatment. They suggested as well that the legal concept that a physician is the "proximate cause" of an iatrogenic event is untenable in the current complex health care environment in which a result may have many contributing causes.

The results of one survey suggest, however, that physicians may be less likely to withdraw life-sustaining treatment for an iatrogenic disease than they would be if the disease had occurred naturally.[13] Although these results are intriguing, it is not known whether physicians would override a patient's refusal of a specific treatment in the setting of iatrogenic illness. Nor is it known *why* physicians might choose to override a refusal of treatment. Finally, it is not known whether physicians would be more likely to treat if the iatrogenic illness were due to the physician's error. In order to begin to find answers to these questions, we studied physicians' responses to case descriptions in which a patient with a do-not-resuscitate (DNR) order suffers a cardiac arrest.

METHODS

This study was conducted at an urban community teaching hospital. Because the hospital has no standing institutional review board, the study was approved by the hospital's administration, which typically fulfills that function. The review board of the authors' home institution declared the study exempt from review. Surveys were distributed to all physicians who received mail through the hospital (n = 358), and follow-up surveys were sent to nonrespondents at 1, 2, and 4 weeks. The sample included all 75 residents at the hospital, in internal medicine, family practice, and obstetrics/gynecology. The sample also included 283 (60%) of the 476 attending physicians with privileges at the hospital in the clinical specialties and in radiology. The proportion of men and women in the sample was similar to that of the population of physicians at the hospital. However, specialties at the hospital were unevenly

represented, and ranged from 31% of all pediatricians to 80% of all internists with privileges at the hospital.

Each physician received a questionnaire that included the same three vignettes (Appendix A). The overall instructions asked respondents to imagine that they had written a DNR order at the patient's request, and that the patient then suffered a cardiac arrest. Respondents were asked to assume that each patient had a 50% chance of returning to his or her previous level of functioning if resuscitation were attempted. Although we are not aware of data to support this figure, we believe that a 50% survival rate is not unreasonable for the arrests due to easily reversible processes, like anaphylaxis and postinfarction ventricular fibrillation, that were described in these vignettes.

For each vignette, physicians were then asked to rate how likely they would be to attempt resuscitation on a 7-point Likert scale: "certainly would not"; "very unlikely"; "unlikely"; "50/50"; "likely"; "very likely"; or "certainly would." Responses to the vignettes were compared with a paired sample *t* test (two-tailed), and an independent sample *t* test was used to compare responses between subgroups. Likert scores were also dichotomized ("certainly would" vs all others) and compared using McNemar's test. Analysis of variance (ANOVA) was used to compare responses among specialties, and correlation was estimated using the Spearman correlation coefficient. Statistical Package for the Social Sciences software for the Macintosh was used for all analyses.

RESULTS

The response rate was 80%. The response rates were similar across specialties and genders, between specialists and generalists, and between housestaff and physicians. Attending physicians who responded had been in practice for a mean of 14 years (range 1–50 years [SD 9.1 years]). Most respondents were in primary care specialties, but many were medical or surgical subspecialists (Table 1).

Table 1. Characteristics of All Respondents (n = 285)

Characteristic	All, *n* (%)	Housestaff, *n*
Male	211 (74)	
Female	74 (26)	
Specialty		
Internal medicine*	138 (48)	38
Surgery	45 (16)	—
Family practice	42 (15)	16
Ob/gyn	27 (10)	5
Psychiatry	10 (4)	—
Anesthesia	7 (2)	—
Pediatrics	7 (2)	—
Radiology	7 (2)	—
Neurology	2 (1)	—

**Subspecialties (n = 56), rehabilitation medicine (n = 1) and dermatology (n = 3) were included in internal medicine.*

Of the three vignettes, physicians reported that they would be least likely to override a DNR order if the cardiac arrest were due to underlying disease (mean 2.55 [SD 1.86]). They reported that they would be more likely to override a DNR order if the arrest were caused by an unexpected complication of treatment (mean 5.24 [SD 1.72]) vs 2.55; difference 95% confidence interval [CI] 2.44, 2.91; paired samples *t* test $p < .001$) and even more likely if the arrest were the result of the physician's error (mean 6.32 [SD 1.38] vs 5.24; difference 95% CI 0.88, 1.20; $p < .001$). When the arrest was due to underlying disease, 8% of respondents said that they "certainly would" resuscitate, whereas 29% said they certainly would resuscitate if the arrest were due to a complication of treatment ($p < .001$). Sixty-nine percent of respondents said that they certainly would resuscitate if the arrest were due to the physician's error (69% vs 29%; $p < .001$) (Fig. 1).

Attending physicians were significantly more likely than resident physicians to resuscitate in the underlying disease vignette (2.68 vs 2.08; difference 95% CI 0.14, 1.05; $p = .03$) in the complication vignette (5.42 vs 4.65; difference 95% CI 0.23, 1.20; $p = .007$) but not in the error vignette (6.38 vs 6.09; difference 95% CI −0.09, 0.71). Attending physicians who had been in practice longer were more likely to resuscitate in the underlying disease vignette, (Spearman coefficient = .159; $p = .02$) but not in the other vignettes. Residents' level of training was not correlated with responses to any of the vignettes.

Responses to the vignettes were not related either to gender (independent samples *t* test) or to the respondent's specialty (ANOVA). However, attending and resident physicians who said that they perform medical or surgical procedures were more likely to resuscitate in the underlying disease vignette (2.71 vs 2.16; difference 95% CI 0.14, 1.05; independent sample *t* test, $p = .02$). Physicians who

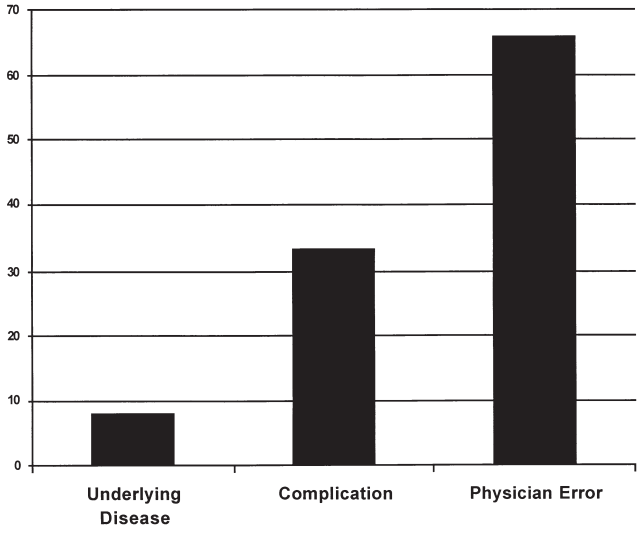

FIGURE 1. Cause of cardiac arrest. Percentage of physicians who "certainly would" override a DNR order in three case vignettes: 8% vs 29% vs 69%; each comparison $p < .001$.

performed procedures were not significantly more likely to resuscitate in the complication vignette or in the error vignette.

Respondents were also asked which of six factors might be important in deciding whether to resuscitate the patients described in the vignettes. Most physicians agreed with several reasons, including uncertainty about what the patient would have wanted (68%), a belief that the patient would have wanted resuscitation (65%), and a belief that it would be "safer to err on the side of caution" and to resuscitate (50%). Respondents also said that they might be motivated to resuscitate by feelings of guilt over having caused the arrest (56%) and agreed with the assessment that in an iatrogenic arrest "the physician, not the disease, would be the cause of the patient's death" (65%). Of all six options, respondents were least likely to cite a fear of malpractice litigation as a reason to override a DNR order (42%). Physicians' agreement with any of these reasons was not related to their responses to the three vignettes (independent samples *t* test).

Ten respondents volunteered that they had resuscitated a patient with a DNR order because the arrest was iatrogenic, and eight physicians offered descriptions of events. All of the descriptions involved an arrest that occurred during or immediately following a medical or minor surgical procedure such as an endoscopy or thoracentesis. Physicians did not indicate whether patients survived, nor did they describe the patient's or family's reaction to the resuscitation attempt. None of the physicians described events that were clearly due to the physician's error.

DISCUSSION

These results suggest that physicians may react very differently to cardiac arrests caused by natural disease and those caused by complications or error, despite similar estimates of a patient's chance of survival. For many physicians in this sample, the fact that a described arrest was iatrogenic even made it permissible to override a DNR order. These results are of interest because competent patients have the ethical right[14] and legal right (*Schloendorff v. New York Hospital*, 211 NY 125, 129, 105 NE 92, 93 [1914]; *Natanson v. Kline*, 186 Kan 393, 406–7, 350 P2d 1093, 1104 [1960]) to refuse even lifesaving treatment.

A DNR order is a widely accepted type of advance directive that enables patients to avoid cardiopulmonary resuscitation. The purpose of this survey was not to study DNR orders. However, DNR orders were chosen as a probe to understand physicians' responses to iatrogenic arrests. These orders are strictly followed,[15,16] and any deviation from this pattern is unusual. These results suggest that in cases of iatrogenic cardiac arrests, physicians may be inclined to attempt resuscitation despite a DNR order, a finding that deserves further consideration.

These data suggest three explanations for physicians' tendency to resuscitate in these case descriptions. First, physicians may have chosen to resuscitate in these vignettes in part out of concern for possible malpractice litigation: 42% of respondents identified this as a reason; however, it is unclear whether legal concerns would be more or less influential in a real situation.

Second, physicians may believe that patients do not consider the possibility of an iatrogenic cardiac arrest when they negotiate a DNR order. That is, physicians may believe that even a properly negotiated DNR order does not apply to all foreseeable circumstances. This explanation of physicians' responses highlights the need for better communication about preferences at the end of life.[17] Do-not-resuscitate orders cannot be viewed as statements of patient preference. They are, at best, symbols that suggest a patient's preferences and goals. Therefore, it may be inappropriate to adhere to a DNR order if there is reason to believe that it does not reflect accurately a patient's autonomous preferences.[12] It is unreasonable to require that physicians discuss all of the possible situations to which a DNR order would apply. However, at a minimum patients must understand that DNR orders typically apply even to easily reversible arrests.

There may be a third explanation as well. Some physicians reported that they might override a DNR order because of feelings of guilt or responsibility. These responses suggest that physicians may perceive a greater obligation to treat diseases that arise from complications of treatment or from error. This is consistent with the observation that physicians drew a distinction between arrests due to complications of treatment and arrests due to error. In fact, the majority said that they "certainly would" override a DNR order to reverse a cardiac arrest that was due to the respondent's own error.

The difference in responses to the complication and error vignettes should not be surprising given the moral and psychological weight that physicians place on errors.[9–11] However, Leape has offered a cogent argument that errors should be viewed as system failures rather than as personal faults,[18] and others have suggested that errors should not alter ethical obligations to respect a patient's refusal of treatment.[12] Our data suggest that physicians may view errors very differently. Specifically, they may perceive an obligation to correct errors when they occur, and they may believe that this obligation outweighs a duty to respect a patient's refusal of treatment.

Although these findings are intriguing, this study has several limitations. First, these results describe physicians' reactions to case descriptions. Although these findings are consistent with our experience, and the experience of others,[19] it is not certain that these physicians would react in the same way in a clinical situation. Nevertheless, these findings should provide the impetus for further research to better understand physicians' behavior in real clinical situations involving iatrogenesis and error.

Another limitation of this study is the fact that the validity of these results depends on clinicians' ability to recognize the iatrogenic nature of a cardiac arrest. Clinicians can treat an iatrogenic arrest differently only if they

are able to recognize that it is, in fact, iatrogenic. In one study, 11% of serious errors reported by house officers were procedure-related complications that were recognized immediately, and 25% of these were fatal.[20] In another study, 14% of iatrogenic cardiac arrests were the result of procedures and their iatrogenic nature would have been similarly evident.[21] In the same study, another 54% of iatrogenic arrests were the result of medications and may have been immediately recognizable as iatrogenic. These studies suggest that iatrogenic arrests are often, but not always, recognizable as such. The results reported in this study may be relevant only to situations, like these, in which an iatrogenic contribution is immediately apparent.

A third limitation of this study is the high (50%) probability of survival that physicians were asked to assume. We do not believe that this figure is unrealistic, given these clinical scenarios. However, if physicians faced with real cardiac arrests believe that a patient's chance of survival would be worse, they may be less likely to attempt resuscitation. Therefore, it is possible that the tendency to resuscitate reported here may be artificially high. Although this is possible, none of the physicians in either the pilot phase or during the study commented that 50% seemed overly optimistic. Therefore, we believe the results reported here represent a reasonable estimate of physicians' behavior in real situations in which they believe a patient has a similar probability of survival.

In the future it will be important to explore the distinctions these physicians made between natural and iatrogenic disease. It will also be important to better define the psychological factors that may motivate responses to iatrogenic events. Further discussion of these issues will be required in order to achieve a consensus among clinicians and patients that reconciles ethical theory with clinical practice, and results in the care that patients expect.

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APPENDIX A

Complication Vignette. You admit a 70-year-old patient with moderate emphysema and pneumonia. He is awake, alert, and you believe he has the capacity to make health care decisions. You write a DNR order in the chart at his request. Shortly after admission, he has an unexpected anaphylactic reaction to the antibiotic that you ordered, which results in a cardiac arrest. How likely would you be to attempt resuscitation?

Error Vignette. You admit a 70-year-old patient with moderate emphysema and pneumonia. He is awake, alert, and you believe that he has the capacity to make health care decisions. You write a DNR order in his chart at his request. You are aware that he has an allergy to penicillin, but you order penicillin by mistake. The patient has an anaphylactic reaction, which results in a cardiac arrest. How likely would you be to attempt resuscitation?

Underlying Disease. You admit a 70-year-old patient with an acute anterior wall myocardial infarction. She is awake, alert, and you believe that she has the capacity to make health care decisions. You write a DNR order in her chart at her request. Shortly after admission she suffers a cardiac arrest, and the cardiac monitor reveals ventricular fibrillation. How likely would you be to attempt resuscitation?