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Factors associated with combined do-not-resuscitate and do-not-intubate orders: A retrospective chart review at an urban tertiary care center

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ABSTRACT

Background: In clinical practice, do-not-intubate (DNI) orders are generally accompanied by do-not-resuscitate (DNR) orders. Use of do-not-resuscitate (DNR) orders is associated with older patient age, more comorbid conditions, and the withholding of treatments outside of the cardiac arrest setting. Previous studies have not unpacked the factors independently associated with DNI orders.

Objective: To compare factors associated with combined DNR/DNI orders versus isolated DNR orders, as a means of elucidating factors associated with the addition of DNI orders.

Design: Retrospective chart review.

Setting/subjects: Patients who died on a General Medicine or MICU service (n = 197) at an urban public hospital over a 2-year period.

Measurements: Logistic regression was used to identify demographic and medical data associated with code status.

Results: Compared with DNR orders alone, DNR/DNI orders were associated with a higher median Charlson Comorbidity Index (odds ratio [OR] 1.27, 95% confidence interval [CI] 1.13–1.43); older age (OR 1.02, 95% CI 1.01–1.04); malignancy (OR 2.27, 95% CI 1.18–4.37); and female sex (OR 1.98, 95% CI 1.02–3.87). In the last 3 days of life, they were associated with morphine administration (OR 2.76, 95% CI 1.43–5.33); and negatively associated with use of vasopressors/inotropes (OR 10.99, 95% CI 4.83–25.00).

Conclusions: Compared with DNR orders alone, combined DNR/DNI orders are more strongly associated with many of the same factors that have been linked to DNR orders. Awareness of the extent to which the two directives may be conflated during code status discussions is needed to promote patient-centered application of these interventions.

Introduction

Advance directives limiting life-sustaining treatment have been widely utilized in the United States since the 1970s, when the American Medical Association first advocated their adoption [1]. Do-not-resuscitate (DNR) orders were introduced as a logical response to an increasing focus on patient autonomy in end-of-life decision-making, and concerns about the provision of inappropriate care, including cardiopulmonary resuscitation (CPR) [2]. Given that respiratory failure may be the final common pathway for terminally ill patients with a range of diagnoses, do-not-intubate (DNI) orders entered into clinical practice at around the same time. The American Thoracic Society has issued guidelines to assist medical practitioners in honoring patients' right to refuse life-sustaining treatment, including intubation and mechanical ventilation (MV) [3]. DNR orders and other advance directives limiting treatment were used in nearly two thirds of more than 31 countries recently surveyed [4]. In 2017, the World Medical Association affirmed the physician's duty to respect patient autonomy and dignity, lending broad, international support to the ethical norm of respecting preferences as stated either by the capacitated patient or their surrogate decision-maker exercising substituted judgment [5]. When properly executed, advance directives, including DNR and DNI orders, are among the most useful tools that a patient—or their surrogate—has for ensuring that preferences regarding life-sustaining treatment are honored.

Discussions of code status commonly bundle cardiac arrest with

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endotracheal intubation, without recognizing pre-arrest respiratory failure as a distinct indication for intubation [6–8]. In fact, in a large multicenter survey of patients who received MV in the ICU, only 1.9% were admitted after cardiac arrest [9]. Treatment outcomes, which are known to influence patient preferences regarding life-sustaining treatment, are notably poorer for in-hospital CPR than for MV for pre-arrest respiratory failure, and vary depending on the specific indication for MV [10–13]. Studies have found that when outcomes are included in code status discussions, they are typically for CPR, but not MV for pre-arrest respiratory failure [14]. These and other observations have raised concerns that DNI orders may not accurately reflect patient preference [15].

A related consideration is the possible effect of DNI orders on other aspects of care, as has been shown with DNR orders. DNR orders reflect a decision to forgo CPR in the setting of cardiac arrest, and are not intended to apply to any other aspect of clinical care; yet, they may be broadly interpreted. Studies have found, for example, that patients are less likely to be triaged to the intensive care unit [16,17], and less likely to receive optimal medical therapy for heart failure [18] when DNR orders are in place. In addition, DNR orders are associated with certain patient characteristics such as older age, a diagnosis of cancer, and longer hospital stay [19–21]. It is of note that DNR status confers a higher risk of death even after adjusting for these characteristics [22].

While the clinical and demographic associations with DNR status are well-documented, the potential additive effect of DNI status is not known. Patients may opt for an attempt at defibrillation and chest compressions without intubation and MV [23]. In clinical practice, isolated DNI orders are usually limited to patients with end-stage chronic respiratory failure [3]. In general, however, patients undergoing cardiopulmonary resuscitation will frequently also be intubated to maintain adequate oxygenation [24]. Thus, in order to elucidate factors associated specifically with the addition of DNI orders, we performed an observational study comparing factors associated with combined DNR/DNI status versus DNR status alone, as an indirect means of isolating the “DNI” variable. We hypothesized that many of the known associations with DNR orders would simply be strengthened by the addition of a DNI order, given that code status discussions may not adequately distinguish between the two directives. A secondary objective was to document the temporal association between DNR and DNI orders, as these directives may be more readily conflated when framed as a continuum of respiratory and cardiac arrest in a single discussion. A greater understanding of the contexts in which DNI orders are added to DNR orders—as well as the downstream effects of combining these orders—may lead providers to better distinguish between these directives, especially for patients in whom key distinctions between CPR and MV would be both clinically relevant and pertinent to the patients’ specific goals of care.

Methods

Study design

This was a retrospective chart review of the electronic medical record (EMR) of all patients who died on a medicine or medical intensive care unit (ICU) service between January 2012 and December 2013 at Bellevue Hospital Center (BHC), a tertiary care safety net hospital in New York City. Baseline and in-hospital characteristics were documented, including age, gender, race/ethnicity, preferred language, insurance status, length of stay, palliative care consultation, and prior hospitalization at BHC within the past six months. Dates of code status entry into the EMR were recorded. Notes were reviewed to identify the decision-maker for code status decisions, and to verify DNI status, which, in practice, is not always entered as a separate electronic order when a DNR order is entered. Code status was defined by active DNR and/or DNI orders documented in the EMR at the time of death. MOLST (Medical Orders for Life-Sustaining Treatment) forms were not analyzed, as these were not incorporated into the EMR during the study period. Comorbid conditions were identified with discharge data codes and chart review to calculate the Charlson Comorbidty Index. Records of administering inotropes, vasopressors, opioids, and benzodiazepines in the last three days of life were compiled, managed, and analyzed using SPSS (v23, IBM). The study protocol was approved by the New York University School of Medicine Institutional Review Board (#14-01268) and the Bellevue Hospital Center Research Department.

Statistical analysis

We evaluated differences in baseline characteristics and treatment decisions between patients who were DNR/DNI and the control group—those who were DNR only—using a *t*-test for comparison of means for continuous variables and a Chi Square test for comparison of categorical variables. Univariate logistic regression was used to identify demographic and medical data associated with code status. Variables found to be significant at a $p < 0.05$ were included in the multivariate analysis. The performance of multivariate logistic regression models was evaluated using a Receiver Operator Characteristic (ROC) analysis, and a model was selected based on Area Under the Curve (AUC). The data are presented as adjusted odds ratios (OR) with 95% confidence intervals (CI). Statistical significance was considered as a p-value less than or equal to 0.05.

Results

A total of 796 patients died at Bellevue Hospital Center between 2012 and 2013. Of these, 197 occurred on the General Medicine or Medical Intensive Care Unit services. The majority of patients with code status (n = 153) had both DNR and DNI orders (n = 84; 55%), as opposed to DNR orders alone (Fig. 1). DNR and DNI orders were placed on the same date in 86% of cases. No patients had DNI orders only. The median number of days until death were 2 and 2.5 following placement of DNR and DNI orders, respectively. Code status was decided by a surrogate decision-maker in 63% of cases. The demographics of the study cohort are shown in Table 1. The study cohort was diverse in terms of race and primary language, with 69% of patients who were non-white and 37% who were non-English-speaking. Common comorbidities included malignancy (46%), diabetes mellitus (30%), chronic kidney disease (31%), and history of cerebrovascular accident or transient ischemic attack either on or before the index admission (35%).

Patient characteristics

When compared with patients with DNR orders only, patients with DNR/DNI orders had a higher median Charlson Comorbidity Index (OR 1.27, 95% CI 1.13–1.43); were older (OR 1.02, 95% CI 1.01–1.04); were more likely to have a malignancy (OR 2.27, 95% CI 1.18–4.37); were more likely to be female (OR 1.98, 95% CI 1.02–3.87); and were more likely to have been hospitalized in the past 6 months (OR 1.95, 95% CI 1.10–3.47). There was a trend towards patients of black race being more likely to be DNR only rather than DNR/DNI when compared with patients of white race (OR 0.45, 95% CI 0.18–1.13, $p = 0.09$). However, this trend was no longer observed when adjusting for age; patients of black race were on average younger than patients of white race (63.5 vs. 74.0, $p < 0.01$). Patients who were DNR/DNI were more likely to have made their own code status decisions, as opposed to having surrogate decision-makers decide on their behalf (OR 4.52, 95% CI 2.16–9.47) (Table 2).

Treatment characteristics

In the last 3 days of life, patients with DNR/DNI orders were more likely to receive morphine (OR 2.76, 95% CI 1.43–5.33); and less likely