

Clinical Science

Preadmission Do Not Resuscitate advanced directive is associated with adverse outcomes following acute traumatic injury



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Abstract

BACKGROUND: Do Not Resuscitate (DNR) orders have been associated with poor outcomes in surgical patients. There is limited literature on admitted trauma patients with advanced directives indicating DNR status before admission (preadmission DNR [PADNR]).

METHODS: A retrospective review of the trauma registry of a suburban county was carried out for admitted trauma patients with age ≥ 41 years, who were admitted between 2008 and 2013.

RESULTS: Of 7,937 admitted patients, 327 had a preadmission advanced directive indicating DNR. PADNR patients were significantly older (87 vs 69 years), with more frequent comorbidities, and were more often admitted after a fall (94.2% vs 65.8%). PADNR patients had a higher Injury Severity Score (14 vs 11). They also had significantly increased rates of pneumonia, sepsis, myocardial infarction, and death (33.6% vs 5.9%). On multivariate logistic regression, the presence of a preadmission advanced directive indicating DNR status was independently associated with a 5.2-fold increased odds of mortality.

CONCLUSION: An advanced directive indicating DNR is associated with adverse outcomes following trauma.

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Do Not Resuscitate (DNR) orders are generally associated with poor outcomes following hospitalization in medical and surgical patients. Multiple reasons for the

high mortality rate have been previously hypothesized. As previously elucidated, patients with DNR orders may have some degree of illness that is not directly measurable.¹ Furthermore, these orders may be written when the patient has a catastrophic, unsurvivable illness.¹ To this end, these orders have been more frequently entered in the last few days of life.²⁻⁴ Finally, patients with DNR orders may have lost the will to live.¹ As such, these orders may be a self-fulfilling prophecy from both the patient's and physician's perspective. Patients with DNR orders may receive less aggressive management or a shift toward symptomatic/supportive care.^{1,5,6} While a 1983 Presidential Commission report indicated that a DNR order should not

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have any implications for any other treatment decisions, these orders have been associated with withholding therapeutic interventions and in some cases have even been erroneously synonymous with “do not resuscitate”.^{5,7–9} Studies on various disease such as stroke have demonstrated that DNR status in the hospital is associated with increased mortality despite controlling for covariates.^{5,10,11}

In the general trauma population, who may or may not be admitted to the intensive care unit (ICU), the presence of a DNR order during hospitalization is associated with mortality rates of 29% to 42% in single-center studies.^{12,13} In multicenter studies evaluating trauma patients admitted to the ICU, the presence of a DNR order is associated with substantially higher in-hospital mortality rates of 88% or 99%.^{14–16}

In contrast to a DNR order that is written during hospitalization, an advanced directive is a legal document that is optimally generated in an elective setting, perhaps even before a patient has developed an illness.^{17,18} It may have one or more components. One is a living will which allows patients to indicate desired/undesired medical treatments in the event that they face a terminal illness and/or otherwise become permanently unconscious. Another is a durable power of attorney for health care/healthcare proxy that allows the patient to appoint a surrogate decision maker when they are no longer able to make decisions.^{18,19} Other documents may supplement these papers or may stand alone.¹⁹ DNR status may be included in these additional documents or be part of a living will. While general hospital admissions are screened for advanced directives as a matter of policy, there is limited literature on trauma patients who have an advanced directive indicating DNR status before hospitalization. We sought to evaluate the incidence and outcomes of trauma patients with a preadmission advanced directive indicating DNR.

Methods

We retrospectively queried a prospectively maintained countywide trauma registry for trauma patients with age ≥ 41 years admitted to hospitals in Suffolk County, New York, from 2008 to 2013. This suburban county has a population of approximately 1.5 million people.²⁰ This county-based registry is a part of the New York State Trauma registry and includes data from 6 state-designated nontrauma centers, 4 area trauma centers, and 1 regional trauma center. Participation in the registry varied by year, with the overwhelming majority of admissions from all these facilities being captured from 2008 to 2011. From 2012 to 2013, the registry only included data from the regional trauma center and 3 area trauma centers. Based on historical information, the registry would be expected to include approximately four-fifths of admissions for trauma in the County from 2012 to 2013. This regional registry falls under the purview of the New York State trauma registry.

The minimal age criterion for this study was set in part based on the age of the youngest patient with a preadmission

advanced directive, that is, 41 years. Deaths in the emergency department were excluded. Demographic characteristics, injuries, comorbidities, and outcomes following discharge were examined. In examining the registry, a preadmission advanced directive indicating DNR status was classified as a National Trauma Data Standard (NTDS) defined comorbidity, that is, an advanced directive limiting care.²¹ Specifically, the NTDS definition states that “the patient had a Do Not Resuscitate (DNR) document or similar advanced directive recorded prior to injury”.²¹ Statistical analyses were performed using Wilcoxon rank-sum test, chi-square test, and Student *t* test as appropriate. Percentage or median values with interquartile ranges are presented; *P* less than or equal to .05 was considered significant. For multivariate logistic regression, we only used variables that had a *P* value less than .1, and a model that generated a Hosmer–Lemeshow statistic with *P* greater than .05. This study was classified exempt by our Institutional Review Board.

Results

A total of 7,937 trauma patients with age ≥ 41 years were admitted to hospitals in this County between 2008 and 2013. There were significant differences in the percentage of patients with preadmission DNR advanced directive (PADNR) among facilities (nontrauma centers 6.2%, area trauma centers 3.9%, and regional trauma center 3.8%; *P* = .001). In comparing the 327 PADNR patients with the 7,610 patients who did not have an advanced directive indicating DNR (non-DNR), multiple demographic differences were noted (Table 1). PADNR patients were older (87 vs 69 years) and less often male (37.9% vs 51.3%). PADNR patients generally had more comorbidities, as follows: hypertension (64.8% vs 51.1%), dementia (43.1% vs 8.6%), anticoagulant use other than aspirin (28.1% vs 17.2%), and respiratory disorders (14.7% vs 8.5%). They were also more often functionally dependent before admission than non-DNR patients (35.2% vs 8.3%). There was no difference in prevalence of diabetes mellitus among groups (20.5% vs 16.9%). However, patients with preadmission DNR were less often obese (11.0% vs 22.4%). Of note, as there is no field indicating none for comorbidities, while the lack of an answer should mean no comorbidity, there is the possibility that it was an inappropriate omission. However, zero preadmission DNR patients and only 38 non-DNR patients had the comorbidity field left blank.

Disparate mechanisms of injury were noted between the 2 groups (Table 1). Namely, PADNR patients were significantly more likely to have been admitted as a result of a fall (94.2% vs 65.1%) and less often as a result of a motor vehicle or motorcycle crash (2.5% vs 20.9%) as compared with patients without an advanced directive for DNR before admission. In evaluating injury patterns, we again noticed differences (Table 2). PADNR patients more frequently had injuries to the head/neck (75.2% vs 59.6%). Of these, however, the incidence of C-spine injury was comparable

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