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## Is the Emergency Department an Inappropriate Venue for Code Status Discussions?

**Daniel G. Miller, MD,**

Department of Emergency Medicine, University of Iowa Carver College of Medicine; Department of Internal Medicine, University of Iowa Carver College of Medicine

**J. Priyanka Vakkalanka, ScM,**

Department of Emergency Medicine, University of Iowa Carver College of Medicine; Department of Epidemiology, University of Iowa College of Public Health

**Morgan B. Swanson, BS,**

Department of Emergency Medicine, University of Iowa Carver College of Medicine; Department of Epidemiology, University of Iowa College of Public Health

**Andrew S. Nugent, MD,**

Department of Emergency Medicine, University of Iowa Carver College of Medicine

**Yuya Hagiwara, MD**

Department of Internal Medicine, University of Iowa Carver College of Medicine

### Abstract

**Background:** An emphasis on early recognition of code status preferences is increasingly making Emergency Departments (ED) a venue for code status discussions (CSDs). Historically, it has been assumed that the ED is a place for maximally aggressive care and Emergency Medicine Providers (EMPs) have a proclivity towards life-prolonging care. In April 2018, our hospital implemented a policy requiring EMPs to place a code status order (CSO) for all patients admitted through the ED. Holding the historical assumptions of the ED & EMPs as true, we hypothesized that the proportion of patients who would select do not resuscitate (DNR) would decrease after requiring CSDs with EMPs for all admissions.

**Methods:** We present a retrospective analysis of rates of DNR orders placed for patients admitted through our ED comparing six-month periods before and after the implementation of the above policy.

**Results:** Using quality improvement data, we identified patients admitted through the ED during pre (n=7,858) and post (n=8,069) study periods. We observed the following: after implementation DNR preference identified prior to hospital admission increased from 0.4% to 5.3% (relative risk (RR) 12.5; 95% CI: 5.2-29.9) in the ED, defining CS in the ED setting at the time of admission

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**Corresponding Author:** Daniel G. Miller, MD, University of Iowa, 1008 RCP, 200 Hawkins Drive, Iowa City, IA 52242, daniel-miller@uiowa.edu, Phone: 319-384-7098, Fax: 319-353-7006.

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increased from 2.4% to 98.6% ( $p < 0.001$ ), and DNR orders placed during inpatient admission was unchanged (RR=0.97 (95% CI = 0.88-1.07)).

**Discussion:** Our results suggest that the ED may be an appropriate venue for CSDs.

### Keywords

Emergency Department; Advance Care Planning; Resuscitation Orders; Electronic Health Records; Quality Improvement; Emergency Medicine

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## INTRODUCTION

Since the origins of the specialty of emergency medicine (EM), EM physicians have identified with the need to preserve and prolong life. It is only in recent years that the value of conversations directed towards the goals of treatment and potential outcomes have changed our perspective on the need to discuss Do Not Resuscitate (DNR) orders with our patients. While EM physicians have become adept at having code status discussions (CSDs) with families of patients in which further care is physiologically futile, there has been less documented success in having these discussions with patients who are not on the edge of vitality but who, none the less, have strong opinions about the care they will accept.<sup>1-3</sup> The original ACEP “Choosing Wisely” campaign of 2013 recommended that all patients who would likely benefit from such a discussion should not have it delayed until they are admitted to the hospital.<sup>4</sup> Early CSD has been shown to benefit select patients and may result in improved quality and quantity of life.<sup>5</sup>

Demographic changes show the United States is entering an era where up to 1 in 5 Americans will be over the age of 65.<sup>6</sup> Also accepted is that the most expensive care is delivered in the last year of life.<sup>7</sup> EM physicians may do a valuable service to both their patients and the larger community by initiating goals of care discussions in the Emergency Department (ED). It has been shown that appropriate DNR orders reduce overall ED use in the last year of life, reducing overall healthcare costs to society.<sup>8</sup> Nevertheless, authors continue to express concern that the ED is a challenging, perhaps even inappropriate, venue for code status discussions to occur and that EM Physicians are uncomfortable with and perhaps inadequately trained to have CSDs.<sup>9, 10</sup> It has even been said that “The DNR concept runs contrary to the credo of EM, which is to preserve life.”<sup>11</sup>

Our study investigates the hypothesis that the ED is an inappropriate venue for CSDs. CSDs are held infrequently in the ED and EM physicians may lack adequate training to have these discussions.<sup>12</sup> The purpose of this study was to assess the impact of mandating EMPs to enter CS on all patients prior to admission from the ED to inpatient wards. We hypothesized that if, in fact, EMPs are poor at having CSDs or if the ED is an inappropriate venue for discussing CS, then the percentage of patients selecting DNR status during their inpatient stay would decline after CS orders were mandated for all ED admissions.

## METHODS

### Study Design, Sample, and Setting

This was an observational analysis of data collected for quality improvement purposes. We compared outcomes of patients before and after a policy implementation that took place between September 2017 and November 2018. The setting for this study included both an ED and inpatient service of a Midwestern academic medical center in the United States with an annual visit volume of 60,000 ED patients and daily inpatient census of 650 patients. Adult patients (> 18 years) who entered the healthcare system via the ED and were admitted were eligible for the study. This analysis of quality improvement data study was granted a waiver by our local institutional Review Board, and the study is reported in accordance with the Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines.<sup>13</sup>

### Institutional Intervention, Treatment and Control Arms

In 2018, our hospital's chief medical officer announced a policy that all patients admitted to the hospital through the ED must have a CS designated before an inpatient bed would be assigned. This was achieved by adding an order for CS to the electronic order set used to request inpatient beds that had to be signed before bed requests would be processed. This order required an EM staff provider to select one of three options, "full code", "DNR" or "other". This new order set was implemented on April 18<sup>th</sup>, 2018. This requirement was not applied to patients who were transferred directly to inpatient beds from other institutions, patients admitted for elective procedures, or patients directly admitted from a clinic.

The pre-intervention period included patients who were admitted through the ED between September 1, 2017 and March 30, 2018. The post-intervention period included patients who were admitted through the ED between May 1, 2018 and November 30, 2018. As part of a sensitivity analysis, we also included a control arm of patients who were admitted through transfers (i.e. not admissions from the ED).

Patient-level characteristics compared between the intervention periods included age (<18, 18-44, 45-64, 65 years old), gender, ethnicity (Hispanic, Non-Hispanic, Other), marital status (Married, Not married, Unknown/Missing), religion (Christian, Non-Christian/Other/Missing), and acuity (Urgent, Non-urgent).

### Outcomes of Interest

The primary outcome in this study was the proportion of patients with a CS of DNR placed in the ED. The CS was evaluated using a combination of key time points and when an updated CS was placed. The time points included date/time stamps of the patient's ED arrival, hospital bed request (which was used as the proxy for inpatient admission), and hospital discharge date/time. Each time a CS was updated, the time stamp of the order was compared to where the patient was at that time (i.e. ED or admitted). Possible outcomes in the ED included missing CS, full code, DNR, or "other" status. Similarly, we also characterized inpatient code status as "missing", "full code", "other" code, or "DNR". If multiple orders were placed for the patient, we retained the last CS order placed by location (ED and inpatient).

Secondary outcomes in this study included in-hospital mortality (measured as by a final hospital disposition of death), intensive care unit (ICU) admission, and overall hospital length-of-stay (LOS). These data were obtained from administrative hospital data.

### Statistical Data Analysis

**Overview**—Demographic characteristics of patients were compared between the pre- and post-intervention periods by Pearson Chi-square tests. For the primary before and after analysis, we compared differences in each outcome. As part of a sensitivity analysis, we performed a difference-in-difference analysis using a comparison group of admitted patients within the hospital that did not go through the ED.

**Main Analysis**—The primary analysis was a before-and-after study of admissions originating in the ED. For the primary outcome, the proportion of patients for whom a DNR order was placed in the ED was evaluated for the pre- and post-intervention periods. Bivariate analyses for the association between the intervention status and the proportion of DNRs ordered in the ED were evaluated using generalized linear models to identify the relative risks (RR) and the 95% confidence intervals (95% CI). This same approach was used with the secondary outcomes of the proportion of in-hospital mortality and ICU admissions. All tests were considered significant at  $\alpha < 0.05$  using 2-tailed tests. Analyses were completed using SAS version 9.4 (SAS Institute, Cary, North Carolina).

**Sensitivity Analysis**—One concern with our before-and-after design was that the possibility of some temporal-related changes that may have occurred over time unrelated to the intervention. In order to determine whether we could have attributed the change in DNR orders due to the intervention that took place in the ED, we performed a sensitivity analysis using a difference-in-difference design. In this approach, we included a comparison group of patients who were transferred to the hospital and admitted as a comparison group. We then evaluated the change in proportion of any DNR placed in the group that received the intervention (ED patients who were admitted), as well as the change in proportion of DNR placed in the group who were transferred. The main reason for including this type of analysis was to also ensure the parallel trends assumption, which would allow us to assess whether the trends in the intervention group would resemble the trends in the control group in the absence of the intervention. To provide evidence for this assumption, we evaluated the trends in both the treatment and control group in the pre-intervention period only. We fit an interaction term between the time period (month) and the treatment group to determine if there was any significant change over time between the intervention and control groups.

## RESULTS

### Description of Study Population

Overall, there were 15,927 adult subjects admitted through the ED in the primary analysis (Figure 1). There were 7,858 and 8,069 subjects in the pre-intervention and post-intervention groups, respectively. The plurality of subjects were 65 years or older (43.0%), non-Hispanic (95.3%), Christian (58.7%), and of urgent acuity (99.6%) (Table 1). Demographics of study subjects did not differ between the pre- and post-intervention groups.

### Primary Outcome: DNR Ordered in the ED

After the intervention, the proportion of patients with a DNR code status in the ED increased from 0.4% to 5.3% (RR: 12.5, 95%CI: 5.2 – 29.9) (Table 2). ED code statuses were also much less likely to be missing in post-period (pre: 98.6% vs. post: 2.4%) (Figure 2). Overall, in the inpatient and ED settings, there was a small increase in any DNR code status (pre: 10.0% vs. post: 12.6% (p<0.001)). This overall increase in DNR codes was due to increased ED codes, as there was no change in inpatient DNR codes after the intervention (RR: 0.97, 95% CI: 0.88 – 1.07) (Table 2).

### Secondary Outcomes: Encounter Mortality, ICU Admission, and Hospital Length of Stay

There was no difference in hospital encounter mortality after the intervention when compared to before the intervention (pre: 4.1% vs. post: 4.0%, RR: 0.97, 95%CI: 0.83 – 1.13) (Table 2). There was also no change in the proportion of subjects admitted to the ICU (RR: 1.02, 95%CI: 0.97 – 1.08) and no change in hospital length of stay (mean difference: 0.09 days, 95%CI: –0.10 to 0.29) (Table 2). Similarly, there were no changes in hospital mortality, ICU admission, and hospital length of stay in the subgroup of those with a DNR code status in the ED (Table 2).

### Sensitivity Analysis: Difference-in-difference models

Using a difference-in-difference model, the sensitivity analysis estimated the effect of the intervention after accounting for any underlying temporal changes in DNR code status. For this sensitivity analysis, the comparator group were inpatients admitted via transfer, admissions for elective procedures, and direct admissions from clinics (not through the ED) (n=16,994). In the pre-intervention period, there was no difference in monthly proportions of a DNR code overall between patients admitted through the ED and those who were non-ED admissions (RR: 0.98, 95%CI: 0.93-1.02), suggesting the parallel trends assumption was not violated. The difference-in-difference estimator was 1.43 (95%CI: 1.01-1.96) (Figure 3). This indicates a 1.43 times increase in the proportion of overall DNR status in the patients admitted to the ED compared to the control group over time from pre- to post-intervention.

## DISCUSSION

After our hospital added a mandatory code status order to our bed request order set for ED admissions, we observed a large increase in the proportion of patients with CS defined prior to transfer to inpatient setting (2.4% pre, 98.6% post (p<0.001)). This is in accordance with previous studies that have found standardization of CS documentation improves its clarity and completeness, and the effect size was larger than previously reported effects from electronic medical record-based initiatives.<sup>14, 15</sup>

Patients' DNR preferences were 12.5 times (95%CI: 5.2-29.9) as likely to be identified prior to admission to the inpatient setting. We observed no change in selecting DNR status within the inpatient setting, thereby refuting the hypothesis that the ED is an inappropriate setting for code status discussions or that "the DNR concept runs contrary to the credo of Emergency Medicine."<sup>14</sup> There is no consensus on what consists of a standard CSD as it is important to provide information about CPR in the context of the patient's illness. However,

our study is suggestive that these complicated conversations may be occurring more frequently with the implementation of the mandatory order rather than as a “check the box” question. To our knowledge, no study to date has reported outcomes when a CS order is mandated in the ED. In the post intervention group, we observed a decrease in mortality among patients selecting DNR status while in the ED. This likely reflects an improved ability to identify DNR preferences in less moribund patients though our hospital’s policy, rather than a survival benefit owing to DNR status. We observed an additive effect on the proportion of patients selecting DNR status in all settings (10% pre, 12.6% post ( $p < 0.001$ )). This is in accordance with previous findings that a communication intervention decreases patients’ preferences for CPR and suggests that enquiring about code status in the ED identified some patients with DNR preferences who were not being identified in the inpatient setting.<sup>16</sup> Future study is perhaps warranted to identify patient factors related to this.

Our study has several limitations. As a pre-post analysis, our results may suggest, but cannot establish, a causal relationship between the intervention and the outcomes. As this is a single institution study the generalizability of our results is limited. Due to the limitations of our quality improvement derived data set we were unable to identify which specific patients with DNR preferences were captured after the intervention who were being missed prior to the intervention. We also did not systematically observe the nature of the CS discussions that occurred after the intervention and thus are not able to comment on the quality of these discussions.

## CONCLUSION

In our study we found that implementing a mandatory CS order for patients admitted from the ED to the inpatient setting resulted in a substantial increase in the rate of identifying DNR preference without any decrease in patients’ selecting DNR status in the inpatient setting. These results suggest that the ED may be an appropriate setting for CS discussions. It has been previously recognized that the highly individual nature of code status and goals of care discussions make it difficult to study them with randomized controlled trials difficult, so mixed-methods studies will have to supplement our knowledge.<sup>17</sup> We would like to further investigate the quality of goals of care and code status discussions in the ED through further studies using additional methods, including systematic observations of these discussions and structured interviews of EMPs and observation. Such mixed-methods studies can investigate EMPs’ comfort with goals of care and CSDs and possibly identify barriers to effective end of life discussions taking place in the ED. Results of such studies may aid in the development of educational interventions to improve end of life care in the ED.

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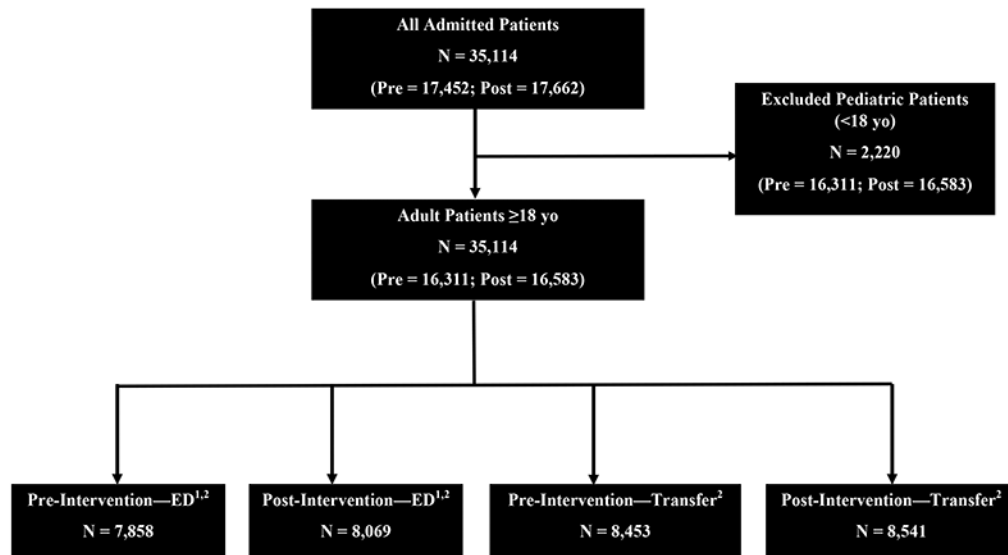
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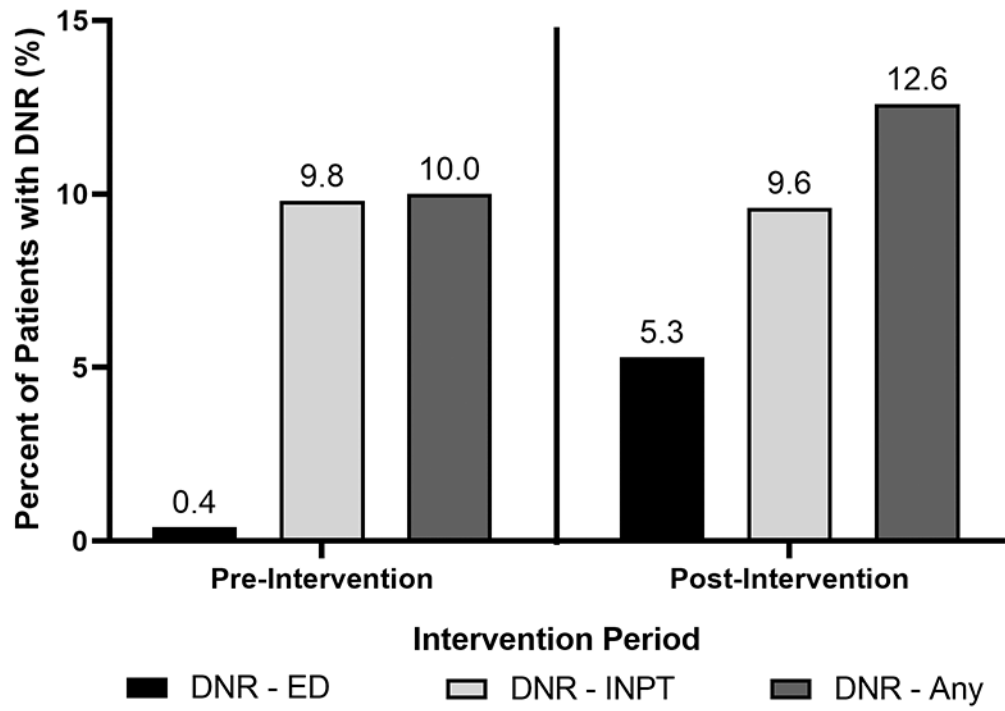
**Figure 1.**

Flow Chart of Study Population

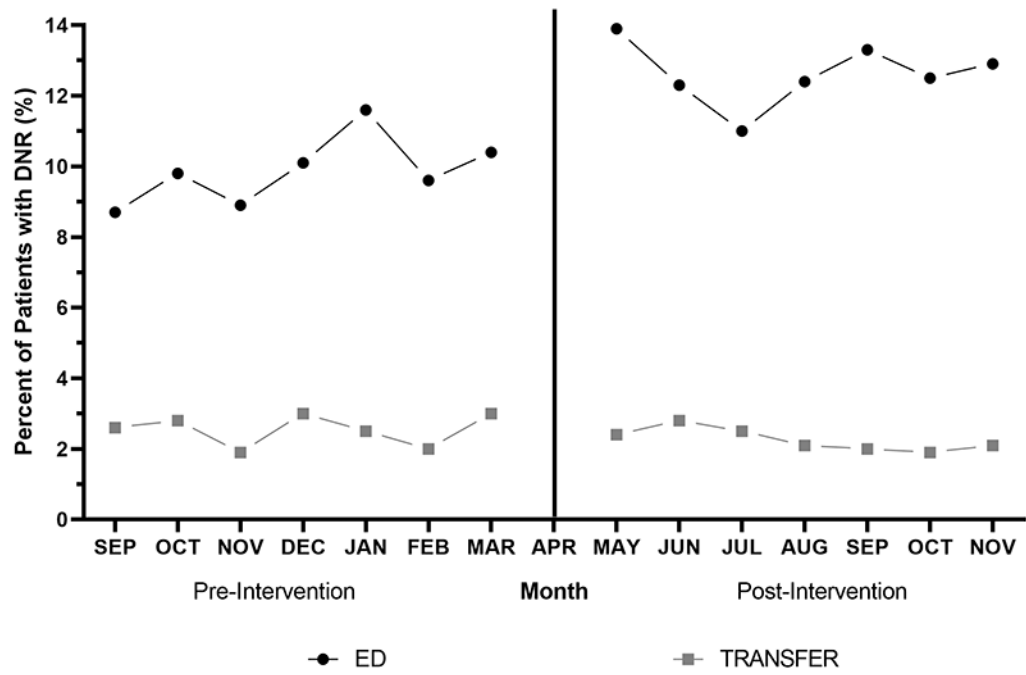
<sup>1</sup> Used for primary analysis—before-and-after analysis

<sup>2</sup> Used for sensitivity analysis—difference-in-difference analysis





**Figure 2.**  
Before and After Analysis: Proportion of DNR Orders Placed by Service and Intervention Time Period



**Figure 3.** Difference-In-Difference Sensitivity Analysis: Comparison of DNR Proportions between ED and non-ED Admissions by Intervention Period.

**Table 1.**

Characteristics of Population in the Pre-Intervention and Post-Intervention Periods

Characteristic	Pre-Intervention Sep 2017 - Mar 2018 N= 7,858		Post-Intervention May 2018 - Oct 2018 N = 8,069		Chi-Sq P-Value
	N	%	N	%	
<b>Age (Years)</b>					
18-44	1,736	22.1	1,695	21.0	0.124
45-64	2,796	35.6	2,844	35.2	
65	3,326	42.3	3,530	43.7	
<b>Gender</b>					
Female	3,559	45.3	4,299	53.3	0.870
Male	4,299	54.7	4,404	54.6	
<b>Marital Status</b>					
Married	3,369	42.9	3,576	44.3	0.178
Not Married	3,799	48.3	3,812	47.2	
Unknown/Missing	690	8.8	681	8.4	
<b>Ethnicity</b>					
Hispanic	274	3.5	284	3.5	0.340
Non-Hispanic	7,497	95.4	7,675	95.1	
Unknown/Missing	87	1.1	110	1.4	
<b>Religion</b>					
Christian	4,600	58.5	4,750	58.9	0.674
Non-Christian	3,258	41.5	3,319	41.1	
<b>Acuity</b>					
Less Urgent/Non-Urgent	31	0.4	31	0.4	0.917
Urgent	7,827	99.6	8,038	99.6	

**Table 2.**

Associations between Intervention and Study Outcomes

Outcomes	Pre-Intervention N=7,858		Post-Intervention N=8,069		Measure of Association/95% CI	
	N	%	N	%	RR	95% CI
<b>Primary Outcome: DNR Ordered</b>						
ED	33	0.4	424	5.3	12.5	5.2-29.9
Inpatient	773	9.8	772	9.6	0.97	0.88-1.07
<b>Secondary Outcome: Mortality</b>						
<b>Overall</b>	324	4.1	322	4.0	0.97	0.83-1.13
<i>Among those with ED DNR</i>	10	30.3	48	11.3	0.37	0.24-0.59
<b>Secondary Outcome: ICU Admit</b>						
<b>Overall</b>	2007	25.5	2110	26.2	1.02	0.97-1.08
<i>Among those with ED DNR</i>	12	36.4	100	23.6	0.65	0.42-1.01
<b>Secondary Outcome: Hospital LOS</b>	<b>Median</b>	<b>IQR</b>	<b>Median</b>	<b>IQR</b>	<b>MD</b>	<b>95% CI</b>
<b>Overall</b>	4	2-7	4	2-7	0.09	-0.1-0.29
<i>Among those with ED DNR</i>	3	1-6	4	2-7	0	-0.02-0.03

Abbreviations: DNR = Do not resuscitate; ED = Emergency Department; ICU = Intensive Care Unit; LOS = Length of Stay (Days); RR = Relative Risk; MD = Mean Difference

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