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Rapid response systems

Code status at time of rapid response activation — Impact on escalation of care?



Alexandra Erath^a, Kipp Shipley^b, Louisa Anne Walker^a, Erin Burrell^c, Liza Weavind^{d,*}

^a School of Medicine, Vanderbilt University, Nashville, TN, United States

^b Pulmonary & Critical Care Medicine, Vanderbilt University Medical Center, Nashville, TN, United States

^c Critical Care Medicine, Vanderbilt University Medical Center, Nashville, TN, United States

^d Department of Anesthesiology and Critical Care Medicine, Department of Surgery, Vanderbilt University Medical Center, Nashville, TN 37212, United States

Abstract

Background: A code status documents the decision to receive or forgo cardiopulmonary resuscitation in the event of cardiac arrest. For patients who undergo a rapid response team activation (RRT) for possible escalation to an intensive care unit (ICU), the presence or absence of a code status represents a critical inflection point for guiding care decisions and resource utilization. This study characterizes the prevalence of code status at the time of RRT and how code status at RRT affects rates of intensive treatments in the ICU.

Methods: We conducted a single-center retrospective cohort study of 895 rapid response activations occurring over six months. The study included all rapid response team activations for non-obstetric adult inpatients documented in the patient chart. All data was obtained through retrospective chart review. STROBE reporting guidelines were followed.

Results: At the time of RRT activation, 56% of patients had a documented code status. Code status prevalence was much higher among medical rather than surgical services (74% vs. 13%). For patients escalated to the ICU, having a DNR code status at RRT was not associated with decreased odds of receiving cardioactive medications or advanced respiratory support. Before RRT activation, palliative care utilization was low (9%) but more than doubled after RRT (24% before discharge).

Conclusions: Barely half of the patients had an active code status at the time of RRT activation. Similar rates of invasive ICU treatments among full code and DNR patients suggest that documented code statuses do not reflect in-depth goals of care discussions, nor does it guide medical teams caring for the patient at times of decompensation.

Keywords: Rapid response team, Code status, Resource utilization, Goals of care

Introduction

The decision to receive or forgo cardiopulmonary resuscitation in the setting of inpatient clinical deterioration and cardiac arrest is grounded in the philosophy of patient autonomy and informed consent. Choosing whether to forgo these interventions during cardiac arrest is commonly referred to as a Do Not Resuscitate order (DNR) and should reflect the outcome of a patient-physician discussion on overall

goals of care for the hospitalization. Elucidating that decision has long been an important component of inpatient care, first highlighted in the United States in 1973 when the National Research Council and the American Heart Association recommended chart documentation of a patient's decision about resuscitation.¹ Legal authority followed with the 1990 Patient Self-Determination Act (PSDA), which required all health care institutions to inform patients about their right to refuse life-sustaining treatment.² Documentation of that patient decision is known as a "code status" order in most electronic medical record

* Corresponding author.

E-mail address: liza.weavind@vumc.org (L. Weavind).

<http://dx.doi.org/10.1016/j.resplu.2021.100102>

Received 30 October 2020; Received in revised form 23 January 2021; Accepted 22 February 2021

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(EMR) systems in use worldwide. In parallel, Europe has witnessed a slower shift from paternalistic to patient-centered decision-making at the end-of-life,³ with considerable heterogeneity between countries. The prevalence of DNR orders has also increased in Asian countries such as China and Korea, with higher use of surrogate decision-makers for choosing DNR status.^{4,5}

In response to a growing emphasis on patient-centered care, research into the effect of DNR orders began to focus on quantifying the overall care and stress associated with end of life. A recent prospective cohort study of critically ill patients found that patients are willing to trade a year of life to avoid painful, extended ICU stays at the end of their life.⁶ Past research suggests that documented DNR orders may help prevent this outcome.^{6–8} One study found that DNR orders are associated with less aggressive medical care at the end of life in patients with advanced malignancies.⁷ Another demonstrated that in patients admitted to the ICU, placement of a DNR order within 48 h was associated with fewer non-beneficial procedures and less perceived suffering.⁹

As code status documentation became more common, electronic medical records (EMR) implemented workflows to expedite code status discussions documentation. Intended to optimize clinician workflow and documentation in a clinical environment, these features may promote careless and inaccurate record completion.¹⁰ Past research has demonstrated the low prevalence of code status documentation in EMRs,^{11–13} with additional recommendations to design EMRs to standardize and simplify code status order entry.¹⁴ However, prioritizing a code status order instead of meaningful documentation of advanced care planning can misrepresent a patient's true wishes for end of life care. Moreover, past research has shown that even patients who have completed extensive advanced care planning before admission may not have their wishes adequately reflected in the EMR.¹⁵

Our study reviewed a specific subset of high-risk inpatients where code status documentation is utilized as a time-sensitive surrogate for defining limits on the escalation of care. Hospitalized patients suffering an acute clinical deterioration often trigger a rapid response team

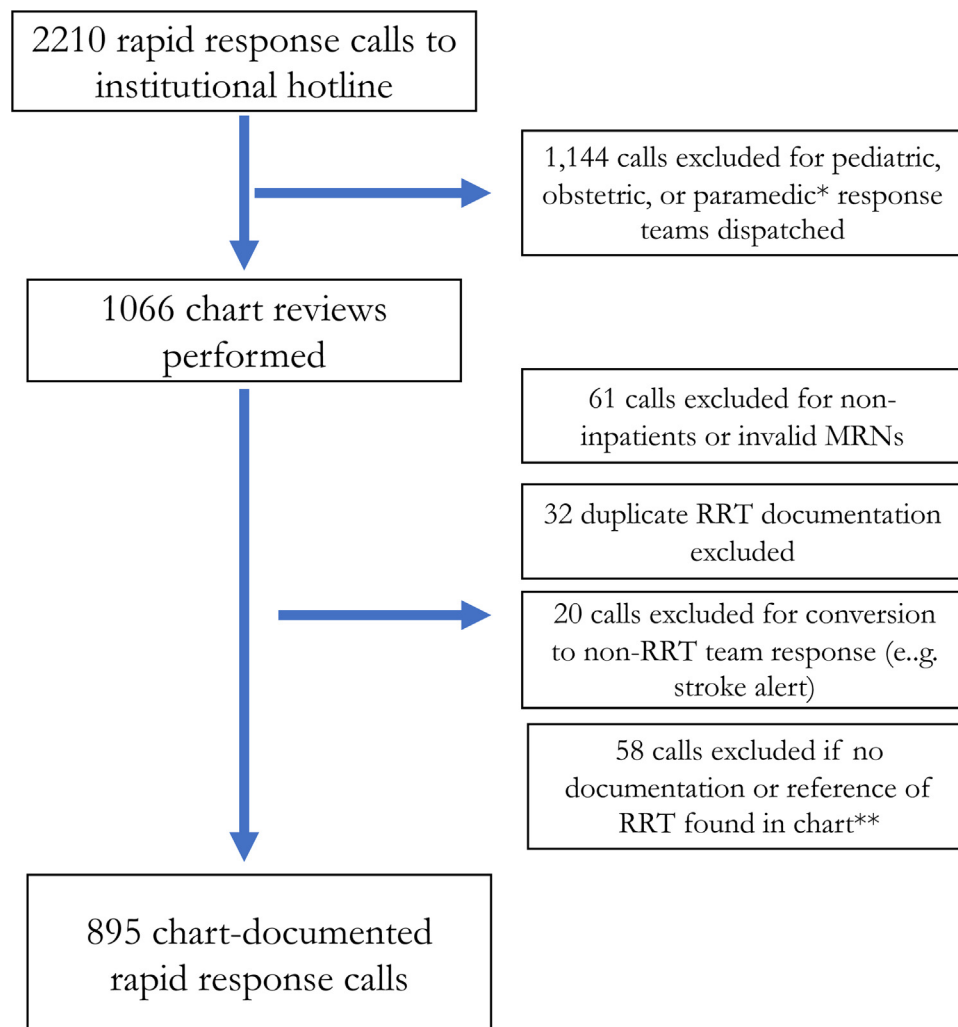


Fig. 1 – Schematic of rapid response activations evaluated for inclusion in the study.

***Paramedic calls represented rapid response team activations for non-inpatients, such as patients' families or patients present at an outpatient clinic such as dialysis or imaging.**

****Documentation in chart included a rapid response team note; a mention in another care provider's note of an RRT activation occurring; vital sign instability at time of rapid response trigger; or a scanned nursing note referencing an RRT event.**

(RRT) activation, which requires timely decisions on aggressive interventions or transfer to intensive care. Perhaps more importantly, an RRT activation represents a critical inflection point where previously established plans for accepting or rejecting life-sustaining treatment impact care delivery and resource utilization. This study sought to characterize the prevalence of code statuses at the time of clinical deterioration and gain insight into the impact of code status orders on patient treatments and resource utilization.

Methods

This retrospective cohort study received approval from the Institutional Review Board and waived the requirement for informed consent. We reviewed 2210 rapid response activations at a large academic hospital over the six months (December 1st, 2018 through May 31st, 2019) through hotline dispatch records. The study medical center was a short-term acute care facility in the Southeastern United States with approximately 1000 staffed inpatient beds and roughly 60,000 admissions per year. Six months was chosen to ensure a robust sample size and a diversity of admitting services. Inclusion criteria included all RRT activations for non-obstetric adult inpatients where corresponding documentation was present in the patient chart. Initial exclusion criteria consisted of pediatric patients, obstetric patients, or persons not currently admitted to the hospital ($n = 1,144$), leaving 1066 calls for which patient charts were reviewed (Fig. 1). Additionally, we excluded rapid response activations converted to another acute team response (i.e., Code Blue or Code Stroke) and activations without documentation in the patient's medical record ($n = 171$), leaving 895 rapid response activations eligible for inclusion. A detailed breakdown of excluded calls can be found in Appendix Table 1.

All data was collected via review of patient charts. The service to which patients were admitted at RRT activation was classified as either primarily medical or surgical (Appendix Table 2). Length of stay before rapid response activation and length of ICU stay were rounded to the nearest integer. Palliative care consults were documented by a palliative care consult order, a palliative care note in the chart, or by the primary team referencing a palliative care consult in daily progress notes. Advanced cardioactive support was defined as cardioactive

medications (i.e., vasopressors, inotropes, or antiarrhythmic infusions), which could not be administered on the hospital floor and required ICU-level care. Advanced respiratory support was defined as the initiation of oxygen supplementation greater than six liters, by new initiation of BiPAP or CPAP, initiation of OptiFlow or High Flow Nasal Cannula, or intubation and mechanical ventilation. Code status was recorded at the time of rapid response activation in a dedicated field in the electronic medical record. A change in code status referred to either implementing a new code status or a switch between full code and DNR.

Before beginning the data collection process, the study authors completed a review of twenty charts independently and compared results to ensure consistent results. Descriptive statistics were calculated in Microsoft Excel and are reported as a percentage of patients or as a median with interquartile range. A multiple logistic regression was conducted to examine differences between rates of ICU transfer and ICU treatment outcomes between code status groups. We report the results of these regressions with the full code group as the baseline, so odds ratios and 95% confidence intervals are reported for only the DNR and no code status groups. Regression analyses were completed using Stata software, version 14.2. STROBE reporting guidelines were followed (Appendix 1).

Results

The median age of the patients was 62 (IQR 48–71) with 52% male ($n = 469$, Table 1). The median length of stay prior to RRT activation was 3 days (IQR 1–8), with 83% of calls occurring for patients with no previous rapid response activations in that hospitalization.

At the time of rapid response activation, just 56% ($n = 500$) of patients had a confirmed code status (Table 2). Medical patients ($n = 634$) had a much higher rate of documented code status than surgical patients (74% and 13%, respectively). Overall, 46% ($n = 409$) of patients were listed as full code, 10% as DNR ($n = 91$), and 44% ($n = 395$) had no code status recorded in their chart.

By the end of the hospital admission, 68% ($n = 504$) of patients had a confirmed code status. There was a median length of stay (LOS) of 0 days (day of admission) before the code status was

Table 1 – Demographic information of patients at the time of rapid response activation. Mortality rate is restricted to first RRT activation per admission.

	All patients ($n = 895$)	Medical ($n = 634$)	Surgical ($n = 261$)
Median age (IQR)	62 (48–71)	62 (48–71)	62 (51–70)
Sex (n)			
M	52% (469)	51% (324)	56% (145)
F	48% (426)	49% (310)	44% (116)
LOS prior to RRT median (IQR)	3 (1–8)	4 (2–8)	2 (1–5)
Overall mortality rate*	13.9% (103)	18% (91)	6% (13)
Number of previous RRT calls			
0	746	515	231
1	121	97	24
2	23	18	5
3	5	4	1
Rate of transfer to ICU	43% (386)	46% (294)	35% (92)

* Calculation of the mortality rate was limited to the first rapid response in a hospitalization to avoid double-counting patients with multiple rapid response activations.

Table 2 – Code status and palliative care consults at time of rapid response and throughout hospitalization. Starred descriptors are limited to the first rapid response activation per hospitalization to avoid over-counting patients with multiple rapid response activations per hospitalization.

Descriptor	Percentage of all calls (n)
Confirmed code status at RRT	56% (500)
Full code	46% (409)
DNR	10% (91)
No code status	44% (395)
Code status rate by primary service	
Medical	74% (466)
Surgical	13% (34)
Confirmed code status in place by end of hospitalization*	68% (504)
Medical	85% (435)
Surgical	30% (69)
Median LOS before code status was implemented (IQR)	
All LOS	0 (0–1)
LOS > 0	2 (1–6)
LOS > 1	5 (3–9)
Code status changed within 48 h of RRT	15% (131)
TO full code	6% (49)
TO DNR/DNI	9% (82)
Palliative consult in place at time of RRT	9% (79)
Palliative consult placed any time within admissions*	24% (180)

* Calculation of the mortality rate was limited to the first rapid response in a hospitalization to avoid double-counting patients with multiple rapid response activations.

recorded, likely reflective of code status documentation in the emergency department. Among patients whose code status was recorded after hospital day 0 or day 1, the median LOS prior to code status documentation was 5 days (IQR 3–9, n = 122). Of the 15% (n = 131) of patients who had a change in code status within 48 h of their rapid response call, 63% (n = 82) were changed to DNR. 9% of patients (n = 78) had a palliative care consult in place at the time of the rapid response activation, and 24% (n = 180) had a palliative consult placed by the end of their admission.

Compared to full code patients, patients who were DNR at the time of RRT activation had a 36% decrease in the odds of ICU transfer (95% CI 0.42–0.98), and patients with no code status had a 41% decrease in the odds of ICU transfer (95% CI 0.44–0.80, Table 3). In the first 48 h after escalation to the ICU, the odds of receiving cardioactive medications or advanced pulmonary support did not significantly differ between patients who were full code at RRT activation compared to patients who were DNR at activation (95% CI 0.58–2.23 and 0.45–1.75, respectively). Similarly, the odds of

Table 3 – ICU escalation rates and treatment outcomes for ICU escalations, by code status at RRT. ICU escalations are reported as a percentage of all RRT activations (data above the grey bar). Rates of cardioactive medications, advanced pulmonary support, and palliative care consults are reported as a percentage of ICU escalations (data below the grey bar). Starred columns represent a statistically significant difference (p < 0.05) when compared to full code patients.

	Full Code (n=409)	DNR (n=91)	No Code Status (n=395)
Rate of ICU Escalation (odds ratio, 95% CI)	50%	36%* (0.64, 0.42–0.98)	38%* (0.59, 0.44–0.80)
Cardioactive Medications (odds ratio, 95% CI)	50%	52% (1.14, 0.58–2.23)	40%* (0.60, 0.37–0.97)
Advanced Pulmonary Support (odds ratio, 95% CI)	56%	45% (0.90, 0.46–1.75)	50% (0.72, 0.45–1.15)
Palliative Consult < 48 hours (odds ratio, 95% CI)	15%	15% (0.90, 0.33–2.46)	8.1% (0.64, 0.30–1.40)

*Calculation of the mortality rate was limited to the first rapid response in a hospitalization to avoid double-counting patients with multiple rapid response activations.

receiving advanced pulmonary support did not significantly differ in patients without a code status at RRT (95% CI 0.45–1.15), although these patients had a 40% decrease in the odds of receiving cardioactive medications (95% CI 0.37–0.97). Compared to full code patients, the odds of receiving a palliative care consult within 48 h of escalation to ICU did not significantly differ for patients who were DNR at RRT (95% CI 0.33–2.46) or for patients without a code status (95% CI 0.30–1.40).

Discussion

Our findings are consistent with previous estimates of code status prevalence. Yet as previous work has shown that severity of illness affects placement of resuscitation orders,^{8,16} our findings are remarkable given our high-risk population of RRT-triggering patients. Our low rates of palliative usage represent another opportunity for improving patient-centered care, as palliative care consults are associated with a higher quality of death and reduce both symptomatic and spiritual distress.^{17,18} The high rate of palliative care consults after ICU escalation suggests a missed opportunity for earlier palliative engagement, especially for DNR patients.

Another important finding from our data is that although a DNR order was associated with less frequent escalation to intensive care, it was not associated with less aggressive interventions for patients transferred to intensive care. DNR orders legally cover resuscitation in the event of cardiac arrest only; they are not synonymous with general limitations of medical therapy. Admitting physicians should have a meaningful conversation about a patient's current condition, their predicted response to treatment and the likelihood of surviving CPR should be included in the larger goals of care discussion. This documentation should be electronically linked to the code status order in the EMR for review during emergent situations. Engaging in this discussion allows the patient to reflect on their goals and what modern medicine can or cannot offer to meet those goals. As research has shown that patients vastly overestimate the chances of survival to discharge after inpatient CPR,¹⁹ patients already choosing to forgo CPR likely have preferences to limit other types of invasive care.

We believe that the lack of association between DNR at RRT activation and any decrease in the odds of receiving aggressive ICU interventions is due to a trend toward perfunctory "checking-a-box" code status discussions. One study found that, despite 98% of medical ICU patients having a documented code status, just 50% of these patients recalled ever discussing a code status with their treatment team.²⁰ Another study of hospital admission conversations found that the median length of code status discussions when they did occur was just sixty seconds.²¹ In the context of these past studies, our findings suggest that, as currently obtained, a documented code status is not a reliable proxy for an informed goals of care discussion.

We also observed a much lower rate of code status documentation among patients admitted to surgical services, a finding which has not been well-described in previous studies. Past research has shown that informed consent for surgery encompasses invasive interventions in the entire perioperative course; furthermore, many surgeons feel that active DNR orders should be suspended in the perioperative period.²² Anecdotally, we have observed that many surgeons feel documented code statuses are redundant for patients who have already consented to surgery. However, intra-operative resuscitation

preferences may differ significantly from patients' overall goals of care and equating the two without careful discussion is an avoidable mistake.

Our study is limited by its single-center design, and some of the findings noted above may be institutional rather than systemic. However, the existing literature suggests that under-utilization of code status discussions and surgical bias against formal code statuses are endemic across institutions. Additional multi-center studies would strengthen our findings to validate our findings across institutions.

Our study results confirm the low prevalence of documented code status discussions before clinical deterioration and provoke questions about the utility of a code status order as an acceptable proxy for meaningful advanced care planning discussions. The former is of unique importance in providing direction to those responding to an RRT activation. Simultaneously, the latter is universally essential to providing care that aligns with the patient's values and goals. To uphold the principle of patient autonomy, we need an improved and standardized metric for establishing and documenting goals of care in hospitalized patients, one which encompasses a thoughtful code status discussion. Physicians' inherent discomfort with code status conversations may be overcome through formal education to normalize goals of care discussions for all patients, rather than just those on palliative care services.^{23,24} The substance and documentation of these discussions are the foundation of patient autonomy, and our study highlights the heightened importance of these discussions before clinical deterioration.

Conflict of interest

The authors have no conflicts of interest to disclose.

Disclaimer

The views expressed in this article are the authors' own and not an official position of their institution.

Sources of support

No direct funding was provided for this study.

Author contribution

All authors conceptualized the study and developed the methodology. AE, EB, KS, and LAW contributed to data collection. AE drafted the manuscript and was responsible for statistical analysis. EB, KS, LAW, and LW revised the manuscript. LW was responsible for project supervision and administration.

Ethics information

We have reviewed the journal's guidelines for publishing ethics for authors and certify compliance with all described standards.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.resplu.2021.100102>.

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