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Case Report

Decoding Code Status: Frequency and Predictors of Discussion with Elective Surgical Patients

Stas Amato[1,2]*, Tessa C. Cattermole,[1]* Richard Mendez[3], Cindy Bruzzese[3,4] Sally Bliss,[1,3] Turner Osler[2], David Hosmer[1], Timothy Lahey[2,4], Edward Borrazzo[1]

[1]Department of Surgery, University of Vermont Medical Center, 111 Colchester Ave, Burlington, VT, 05401, USA

[2]Ethics Consultation Service, University of Vermont Medical Center, 111 Colchester Ave, Burlington, VT, 05401, USA

[3]Department of Mathematics and Statistics, University of Vermont, 82 University Place, Burlington, VT, 05401, USA

[4]Department of Medicine, University of Vermont Medical Center, 111 Colchester Avenue, Burlington, VT, USA

***Corresponding author:** Stas Amato, Department of Surgery, University of Vermont Medical Center, 111 Colchester Ave, Burlington, VT, 05401, USA

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Abstract

Background: Surgical providers assume responsibility for shared decision-making of patient treatment goals for potentially life-threatening problems in the setting of operative procedures. However, a low proportion of surgical patients have code status discussions with their providers prior to surgery. We aim to describe the frequency and independent predictors of preoperative code status discussions in the setting of elective surgical procedures. **Methods:** This is a retrospective cohort study at a single academic, tertiary care center from January 1, 2018 to September 27, 2019. Participants include adult patients undergoing elective surgical procedures. Documented preoperative code status discussion is the main outcome measure. Multivariate logistic regression was used to identify independent predictors of code status discussion. **Results:** Among 5,208 elective surgical procedures, preoperative code status discussion was documented in 16.6% encounters. Code status discussions were documented more frequently in encounters with patients with DNR status (72.9%) compared to patients with full code status (15.9%). We found that age, male sex, obesity, cancer, peripheral vascular disease, and chronic kidney disease were independent predictors of code status discussion. Categories of procedures associated with code status discussion included cardiac, abdominopelvic, and perineal and anal. **Conclusions:** Most patients undergoing elective surgery have no documented perioperative code status discussion, and the proportion of discussion was greatest among patients with prior DNR status. Patient age, sex, comorbidities and type of surgery were independent predictors of code status discussion.

Introduction

Code status discussions identify patient preferences for cardiopulmonary resuscitation in the event of cardiac or respiratory arrest. In addition to informed consent, clarifying code status is particularly important for surgical shared decision-making. These discussions are a preeminent tool to deliver care that aligns with patient goals, and this is particularly true in the preoperative period. Intraoperative cardiac arrest, though rare with an incidence of 7.2 per 10,000 surgeries [1] is a potentially catastrophic event that warrants preoperative shared decision-making between patient and provider.

Advance care planning can strengthen patient autonomy, improve quality of care near the end of life, and reduce healthcare expenditures [2] Studies show that when clinicians have to rely on surrogates to make end-of-life decisions through substituted judgment, surrogates incorrectly predict patients' end-of-life treatment preferences in one third of all cases [3] highlighting the importance of having these discussions with the patient preoperatively when able. The American Society of Anesthesiologist (ASA) and American College of Surgeons (ACS) guidelines agree that it is inappropriate to automatically suspend a patient's DNR and required reconsideration is the standard of care [4,5]

The statement on perioperative advance directives released by ACS stresses the importance of the surgeon assuming responsibility for discussion of the patient's treatment goals and an approach for potentially life-threatening problems consistent with the patient's values and preferences [5] This ACS policy focuses on required reconsideration, where a patient or designated surrogate and the surgeons discuss the intraoperative and perioperative risks, treatment goals, and approach for cardiac arrest in the setting of a current "Do Not Resuscitate" (DNR) order. Automatic acceptance or disregard of prior DNR orders does not support patients' right to self-determination, is unethical, and highlights the importance of perioperative code status discussions. The guidelines and requirements for code status discussion for patients who do not have prior DNR orders are less clear.

While surgical providers assume responsibility for shared decision-making of patient treatment goals for potentially life-threatening problems in the setting of operative procedures, patient preferences are infrequently explored, practiced, or documented preoperatively [6] The preoperative informed consent process can serve as a timely and critical opportunity to discuss code status with patients who may not otherwise frequently engage with the healthcare system. In this study we assess the frequency of elective surgical patients that have preoperative code status discussions, and identify independent predictors of these discussions.

Methods

Design, setting, participants. This is a retrospective cohort study of adult patients presenting to a single academic, tertiary care center for elective surgery from January 1, 2018 to September 27, 2019. The University of Vermont institutional review board approved the study and waived the need to obtain patient consent given the nature of the study (Study ID: 00000960). We included patients over the age of 18 presenting for elective surgical procedures and counted each elective procedure encounter in the analysis.

Data collection. Eligible patients undergoing elective surgical procedures during the study period underwent electronic health record (EHR) review. The main outcome and dependent variable of this study is documented code status discussion prior to an elective surgical procedure. This variable was obtained from a required Code Status Order Panel (Appendix 1) in the EHR where providers indicate whether a patient is "Full Code" or has a "Limitation of Treatment." After this designation, providers are required to indicate who participated in the discussion, from the following selections: patient, family (please specify), other (please specify), or not discussed. Encounters with a selection of patient, family or other specified surrogate decision makers were considered to have a code status discussion. Independent variables collected include patient age, sex, comorbidities, American Society of Anesthesiologists physical status classification (ASA class), and surgical procedure category.

Statistical analysis. We compared characteristics of patients who had a code status discussion to those patients who did not have a code status discussion using counts, percentages, Pearson's chi-squared tests, t-tests and Wilcoxon rank-sum tests for comparisons of parametric and non-parametric variables, respectively. We used multiple variable logistic regression to identify independent predictors of code status discussion, with stepwise backwards elimination of variables with a p-value less than 0.2.7 Associations are reported as risk-adjusted odds ratios, with a p-value less than 0.05 denoting statistical significance. All statistical analyses were performed using Stata Statistical Software: Release 17. College Station, TX: StataCorp LLC.

Results

Of the 5,208 elective procedures conducted between January 1, 2018 and September 27, 2019, code status discussion was documented in 864 (16.6%) encounters. In univariate analyses, patients with previously documented limited code status during the encounter were more likely to have code status discussion (n=43, 72.9%) compared with patients with full code status (n=821, 15.9%). Compared to patients who did not have a documented code status discussion, patients whose code status was discussed

were older, more likely male and had a higher average ASA class (Table 1).

The presence of patient comorbidities were associated with the likelihood of code status discussion. Code status discussion was more likely among patients with a cancer diagnosis, coronary artery disease, and obesity and less likely among patients with diabetes (Table 1). Planned elective surgery type also predicted the likelihood of code status discussion. Code status discussion was more likely among patients who underwent abdominopelvic procedures and cardiac procedures but less likely among patients with head and neck, intracranial, extremity, soft tissue, spine, and vascular procedures (Table 1).

	Discussed	**Not discussed**	**P-value**
	(n=864)	(n=4344)	
Patient age, median (IQR)	67 (60-73)	66 (57-73)	<0.001
Patient sex, n (%)	590 (68.29)	2299 (52.92)	<0.001
Male	590 (68.29)	2299 (52.92)	<0.001
Female	274 (31.71)	2045 (47.08)	
Code status, n (%)			
Full code	821 (95.02)	4328 (99.63)	<0.001
Limited treatment (DNR/DNI)	43 (4.98)	16 (0.37)	
ASA class, mean (SD)	2.89 (0.02)	2.75 (0.01)	<0.001
Mortality, n (%)	5 (0.58)	11 (0.25)	0.114
Comorbidities			
AIDS	4 (0.46)	16 (0.37)	0.681
Cancer	336 (38.89)	1102 (25.37)	<0.001
Cerebrovascular disease	114 (13.19)	669 (15.40)	0.098
Coronary artery disease	336 (38.89)	1246 (28.68)	<0.001
Congestive heart failure	94 (10.88)	432 (9.94)	0.405
Chronic kidney disease	123 (14.24)	620 (14.27)	0.978
Chronic liver disease	2 (0.23)	8 (0.18)	0.772
COPD	77 (8.91)	484 (11.14)	0.054
Diabetes	267 (30.90)	1656 (38.12)	<0.001
Peripheral vascular disease	70 (8.10)	407 (9.37)	0.238
Obesity	556 (64.35)	2576 (59.30)	0.006
Underweight	5 (0.58)	46 (1.06)	0.19
Procedure category, n (%)			
Abdominopelvic	458 (53.01)	976 (22.47)	<0.001
Cardiac	179 (20.72)	100 (2.30)	<0.001
Eye	4 (1.17)	51 (0.46)	0.062

Head and neck	2 (0.23)	136 (3.13)	<0.001
Intracranial	15 (1.74)	136 (3.13)	0.026
Extremity	34 (3.94)	1315 (30.27)	<0.001
Perineal and anal	43 (4.98)	170 (3.91)	0.149
Soft tissue	29 (3.36)	233 (5.26)	0.014
Spine	8 (0.93)	406 (9.35)	<0.001
Thoracic	7 (0.81)	65 (1.50)	0.115
Vascular	76 (8.80)	690 (15.88)	
Abbreviations: DNR - do not resuscitate; DNI - do not intubate; IQR - interquartile range; SD - standard deviation; AIDS - acquired immunodeficiency syndrome; COPD - chronic obstructive pulmonary disease.			

Table 1: Legend: Patient characteristics by presence or absence of discussion, unadjusted.

Multivariate logistic regression analyses (Figure 1) revealed age by years (OR 1.01 95% CI 1.01-1.02; p<0.001) and male sex (OR 1.80, 95% CI 1.51-2.15, p<0.001) as independent predictors of code status discussion. Patient comorbidities that were independent predictors of code status discussion included obesity (OR 1.48, 95% CI 1.24-1.77; p <0.001), cancer (OR 1.46, 95% CI 1.21-1.76; p <0.001), peripheral vascular disease (OR 1.47, 95% CI 1.08-2.00, p=0.015), and chronic kidney disease (OR 1.34, 95% CI 1.06-1.70; p=0.016). Code status discussions were more common among patients undergoing cardiac (OR 19.1, 95% CI 13.89-26.34; p<0.001), abdominopelvic (OR 4.27, 95% CI 3.40-5.37; p<0.001), and perineal and anal (OR 2.79, 95% CI 1.88-4.14; p<0.001) surgeries but less frequent among patients undergoing head and neck, extremity and spinal procedures.

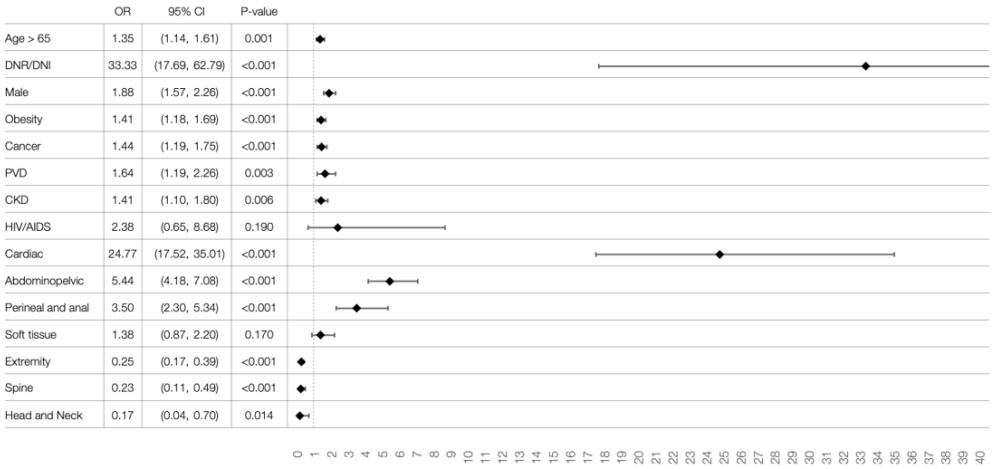

Figure 1: Forest plot of independent predictors of code status discussion **Legend:** Forest plot demonstrating independent predictors of code status discussion based on logistic regression model. PVD - Peripheral Vascular Disease, CKD - Chronic Kidney Disease, AIDS - Acquired Immunodeficiency Syndrome.

Précis: The majority of elective surgical patients are not engaged in code status discussion with their surgical provider preoperatively. We describe independent predictors of documented preoperative code status discussions.

Discussion

Summary of results: The majority of preoperative patient encounters for elective surgical procedures (83%) did not include a code status discussion. Providers were more likely to document code status discussions for older patients, male patients, patients with medical comorbidities, and those undergoing cardiac elective surgeries.

Significance of findings. For patients in this study without a documented code status discussion, providers reported that full code status was "consistent with the overall plan of care." However, to be aligned with a patient's goals of care, a discussion should be considered during the preoperative informed consent and shared decision-making processes. This is particularly true if the surgeon believes a preexisting do not resuscitate order should be overturned in the perioperative period, during which reconsideration of code status must be discussed with the patient [8] In this cohort, documented code status discussions occurred in 72.9% of encounters with patients who had documented limitations of treatment. This demonstrates a gap in required reconsideration.

Since a substantial minority of patients would choose some delimitation of the care they receive and perioperative goals of care discussions are notoriously insufficient [9, 10] preoperative code status discussions are critical to confirm agreement with full code status and to identify other measures that might be unwanted. Additionally, the assumption of full code status in the absence of code status discussion could be considered a lapse in shared decision-making and a breach of the Patient Self-Determination Act [11, 12]

Contextualization: Despite the emphasis on shared decision-making in the Affordable Care Act (section 3506), there is a lack of data on the engagement of surgical patients with advance care planning and how it relates to their decision-making for surgery [13,14] There are few studies reporting the frequency and predictors of preoperative code status discussions with patients presenting for elective surgery, and findings from prior reports are concordant with this study. [6,14–16]

One study found that 42% of surgical patients with preoperative Medical Orders for Life-Sustaining Treatments had documented code status discussions before surgery.15 Another study of elective surgical patient encounters found that 33% had deficits in preoperative shared decision-making, including informed consent deficits, and not having addressed patient values, preferences and goals.14 Another study of patients presenting for major surgery, advance care planning discussions occurred in only 6% of preoperative consultations, and 66% did not have an advance directive on file before major surgery. A retrospective multicenter case series demonstrated that code status was re-evaluated in only 28% of patients undergoing inpatient procedures with do-not-resuscitate orders [16] The current study builds on this prior work by assessing and identifying independent predictors of code status discussions among adults undergoing elective surgical procedures.

Limitations: This study was limited to elective procedures at a single academic medical center where perioperative protocols may not be generalizable to other centers or healthcare settings. The sample size is relatively small which may have precluded identification of less powerful predictors of code status discussion. We did not voice or video record the preoperative code status discussions, and thus, it is beyond the scope of this study to identify specific contents of discussions or whether the code status order accurately reflected the occurrence of a discussion.

While completion of the code status order panel is required prior to booking surgical procedures, we suspect that the electronic health records underestimate the frequency of code status discussion, since other providers (e.g. primary care providers out of network) may discuss code status without completing the order panel documentation. Also, documentation of code status discussion should not be equated with an ideal discussion of patient goals of care [17] While discussions about CPR are included in advance care planning, they are not a substitute for comprehensive advance care planning.

Future directions. Our findings highlight an urgent need to improve preoperative code status discussions for the elective surgical population, a group that may be at greater risk of receiving care that is inconsistent with patient goals and preferences. Reporting frequencies and independent predictors of code status discussions could lead to the development of measurable quality improvement initiatives for patient goal-concordant care.

It has been well documented that physicians at all levels are insufficiently trained for and inappropriately perform code status discussions [10] Quality improvement initiatives could include provider training through low fidelity simulations of code status discussions during the informed consent process. Additionally, modifications to code status order panels in the electronic medical record that provide easy access to key information, such as links to existing advance care planning documents may prompt further inquiry and clarification about patient preferences and priorities related to code status in the preoperative care setting. Aligning choices and wording of inpatient orders to mirror out-of-hospital portable orders for life-sustaining treatments may further enhance consistency in language and promote improved communication about such decisions across the inpatient and outpatient clinical environments.

Future research could replicate these findings in diverse health care settings and patient populations, identify system approaches to reducing obstacles to preoperative code status discussions [18] and explore how primary care and surgical practices can collaborate on the longitudinal work of code status discussions and advance directives. Further research is needed to determine the impact of code status discussion on clinical care, healthcare costs, and patient-centered outcomes.

Conclusions

Most preoperative patient encounters for elective surgical procedures (83.4%) did not include a code status discussion. Patient age, sex, comorbidities and type of surgery were independent predictors of code status discussion. Further research is needed to explore best practices and quality improvement of perioperative shared decision-making and to determine the impact of code status discussions on clinical care, costs, and patient-centered outcomes.

Study Type: Observational retrospective cohort

Level of Evidence: Level 3

Author Contributions

Author Contributions: E.B. and R.M. conceived of the presented idea. S.A., and T.C., developed the research methods and performed the computations. T.L., T.O., and D.H. verified the analytical methods. S.A., T.C., T.L, C.B., and S.B. drafted the initial manuscript. All authors discussed the results and contributed to the final manuscript.

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Meeting Presentation

The abstract (abstract #) was presented at the Academic Surgical Congress in February 2022.

Highlights

1) A low proportion of elective surgical patients have preoperative code status discussions with their providers.

2) Independent predictors of code status discussion included male sex, obesity, cancer, PVD, CKD, and elective cardiac, abdominopelvic, perineal and anal surgeries.

3) Not all patients with limited code status had a documented code status discussion, representing a gap in required reconsideration.

Data Availability: De-identified data could be made available upon request and with data use agreement approval.

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