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Critical Care Documentation for the Dying Trauma Patient: Are We Recognizing Our Own Efforts?

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Abstract

Background: Missed documentation for critical care time (CCT) for dying patients may represent a missed opportunity for physicians to account for intensive care unit (ICU) services, including end-of-life care. We hypothesized that CCT would be poorly documented for dying trauma patients.

Methods: Adult trauma ICU patients who died between December 2014 and December 2017 were analyzed retrospectively. Critical care time was not calculated for patients with comfort care code status. Critical care time on the day prior to death and day of death was collected. Logistic regression was used to determine factors associated with documented CCT.

Results: Of 147 patients, 43% had no CCT on day prior to death and 55% had no CCT on day of death. 82% had a family meeting within 1 day of death. Family meetings were independently associated with documented CCT (OR 3.69, $P = .008$); palliative care consultation was associated with decreased documented CCT (OR .24, $P < .001$).

Conclusions: Critical care time is not documented in half of eligible trauma patients who are near death. Conscious (time spent in family meetings and injury acuity) and unconscious factors (anticipated poor outcomes) likely affect documentation.

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Author Contributions

Samuel Zolin performed literature review, data collection, statistical analysis, and manuscript composition. Jasmin Bhangu and Brian Young assisted with data collection. Sarah E. Posillico and Husayn Ladhani assisted with regulatory compliance and establishment of the study database. Jeffrey Claridge assisted with research design. Vanessa Ho assisted with initial conceptualization of the project and research design. All coauthors assisted with critical revision.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Vanessa Ho's spouse is a consultant to Medtronic, Zimmer Biomet, Sig Medical, and AtriCure.

Keywords

critical care; billing; trauma; surgical palliative care; documentation

Introduction

Approximately 1 million trauma patients are admitted to the intensive care unit (ICU) annually in the United States, and 10.7% of these suffer in-hospital mortality.[1] Despite the relatively high mortality rate in this population and the well-established significant financial costs of caring for ICU patients at the end of life,[2] little is known about how surgical critical care practitioners document for the services that they provide to this population. Previous work has demonstrated that surgeons frequently document in a suboptimal fashion, with institutional financial consequences stemming from missed charges on the order of millions of dollars annually.[3–5] At our institution, approximately 44% of hospital charges generated by our trauma and surgical critical care staff come from nonprocedural documentation, underscoring the financial importance of accurate documentation of evaluation and management practices at service and institutional level.[6]

Critical care billing requires documentation of time spent by a physician providing eligible services. To qualify, physicians must provide more than 30 minutes of direct medical care to a critically ill patient, where one or more vital organ systems are acutely impaired such that there is a high probability of imminent or life-threatening deterioration, with high complexity decision-making to assess and support vital system functions. Treatment must be medically necessary and reasonable, and physicians must devote their full attention to these patients for the time documented. Beyond physiologic support, ICU practitioners also provide primary palliative care services that guide high complexity decision-making, including discussions about goals of care and symptom palliation. It is unclear whether ICU physicians account for these services consistently when documenting and billing. Lack of physician documentation of critical care time (CCT) could represent a significant source of potential lost charges with downstream implications for health care systems.

To understand patterns of critical care billing for trauma patients at the end of life and factors that influence the likelihood of CCT being documented and billed, we analyzed CCT documentation for moribund trauma patients in the ICU. We hypothesized that among critically ill trauma patients with code statuses permitting intensive treatment who died, we would be able to identify missed opportunities for CCT and factors that influenced CCT documentation. We also hypothesized that surgical intensivists would be less likely to document CCT on days where comfort care measures were initiated, even if critical care was provided prior to a code status change.

Methods

A single-center retrospective cohort study analyzing critical care documentation in trauma patients at the end of life was performed at our mature, urban, academic, level 1 trauma center.[7] Criteria were selected to identify dying patients who would be eligible for critical care billing prior to death. We screened all adult patients who were included in our

prospectively maintained trauma registry and identified all patients who died between December 2014 and December 2017. Any adult trauma patient located in the ICU the day prior to death with a code status emphasizing life-prolonging treatment was included. Patients who died within 24 hours of hospital admission were excluded. The outcome of interest was the presence of CCT documented on the day prior to death and on the day of death. Patients whose code status was changed to Do-Not-Resuscitate comfort care (DNR-CC) on the day prior to death, who were transferred to the regular nursing floor, or whose death occurred before rounds started at 8 AM were excluded from analysis on day of death. Two cohorts were analyzed: patients potentially eligible for CCT on day prior to death and patients potentially eligible for CCT on day of death.

Demographic and injury characteristics were obtained from the prospectively maintained trauma registry and confirmed through chart review. All ICU notes were reviewed for clinical information, documentation and dates of family meetings, and documentation of CCT. Daily CCT was summated for the day prior to death and day of death to determine the total time documented for each day. A family meeting was defined as a documented conversation between any appropriate representative of the patient and a physician or caregiver where goals of care, prognosis, desired extent of medical or surgical treatment, and/or code status were discussed. The occurrence of a family meeting within one day of death was selected as a variable of interest, given that these should increase the ability of providers to bill for critical care services on the day that they occur and reflect clinical circumstances warranting ongoing management decisions. Palliative care consultation was also collected as a variable of interest.

Our hospital admits over 2000 trauma patients per year and has a dedicated trauma ICU staffed by surgeon intensivists, all board certified in critical care. One or more staff were in the hospital at all times during this study period and, therefore, were available to provide critical care services and documentation. Our institutional practice is for daily ICU progress notes to be drafted on rounds with the assistance of scribes and signed and verified by staff. In the setting of significant changes in clinical status or goals of care, staff, critical care fellows, and residents may write additional updated notes. Critical care time may be documented by attending in any of these note types and is additive for a given calendar day.

Since 1999, in the state of Ohio, there are 2 types of “DNR” orders which can be designated: “DNR comfort care” (DNR-CC) or DNR comfort care-arrest” (DNR-CCA).[8] A DNR-CC order states that a patient can have medical treatments to diminish pain or discomfort, but not to postpone the patient’s death; when a DNR-CC order is placed, the goal of comfort measures is initiated immediately. Do-Not-Resuscitate comfort care-arrest indicates that a patient would like comfort care measures activated at the time a patient experiences cardiac or respiratory arrest. Until the point of cardiac or respiratory arrest, life-prolonging treatment such as mechanical ventilation (unless specifically specified as Do-Not-Intubate), transfusions, pressors, and surgery are continued. For the purposes of this study, patients who were DNR-CCA were categorized as receiving life-prolonging treatment.

Statistical analysis was performed by the authors using the R software package version 3.5.1 (Vienna, Austria). Descriptive statistics were used to characterize the study population.

Bivariate comparisons were performed using Mann-Whitney U tests for non-normally distributed continuous variables and Fisher's exact test for categorical variables. Multiple logistic regression was performed using a forward and backward stepwise approach to determine factors associated with the presence of CCT on the day prior to death and day of death. Variables with $P < .20$ on bivariate analysis were included as inputs for multivariate modeling, and the model that minimized the Akaike information criterion was selected. Validation of the model's predictive accuracy was performed using k-fold cross-validation repeated 10 times, with $k = 10$. This process partitions the data set into 10 "folds," using 9 folds as data to train the model and the remaining folds as data to test model accuracy. Significant variation in model accuracy when this process is repeated suggests over-fitting. For all analyses, statistical significance was defined as $P < .05$. Institutional review board approval was obtained with waiver of informed consent.

Results

During the study period, 200 patients died after initial trauma evaluation. After exclusion of ineligible patients (Figure 1), 147 patients remained eligible for analysis on the day prior to death, and 105 remained eligible for analysis on the day of death (Tables 1 and 2). Patients admitted to other services (such as medicine) without injuries who were cleared by the trauma service are included in the trauma registry but were excluded from our study. The patient cohort consisted primarily of older, white, male patients. Over 90% were injured through nonviolent mechanisms and there was a high prevalence of severe head injury in this cohort.

Based on lengths of ventilator use and ICU stay, most of these patients had sustained efforts at physiologic support prior to death. Most patients had at least 1 family meeting documented. Review of critical care documentation demonstrated that patients who were eligible for CCT on the day prior to death and on the day of death by our estimation frequently did not have CCT, with 42.9% and 53.3% of patients potentially eligible for CCT having no CCT documented in ICU progress notes for those days, respectively. There was a large overlap in patients who did not have CCT documented on the day prior to death and the day of death; 51 of the 56 patients without CCT documentation on the day of death also did not have CCT documented on the day prior to death, despite being in the ICU.

Multiple logistic regression was used to identify independent factors that affected likelihood of CCT (Table 3). The model constructed for the day prior to death demonstrated that occurrence of a trauma arrest, increasing number of surgical interventions, full code status at admission, and occurrence of a family meeting within 1 day of death were independently associated with increased likelihood of CCT, while palliative care consultation was independently associated with decreased likelihood of CCT. Results of k-fold cross-validation with $k = 10$ and repeated 10 times demonstrated a mean predictive accuracy of 70.9%, suggestive that there are likely other unidentified factors influencing CCT, with a standard deviation of 1.4%, a relatively low variation in predictive accuracy, suggesting that the model is not overfit to the data. Due to the lower sample size in the day of death cohort, we did not construct a model for day of death.

Discussion

For trauma patients within 2 days of dying, CCT is documented on only about half of eligible days. The occurrence of a trauma arrest, increasing number of surgical interventions, full code status at admission, and occurrence of a family meeting within 1 day of death are independently associated with increased likelihood of CCT on the day prior to death, while palliative care consultation is independently associated with decreased likelihood of CCT. This represents a significant opportunity for improvement for trauma services to recoup appropriate reimbursement for our sickest patient population, to whom we provide resource-intensive care.

There are several potential reasons that these factors might influence presence of CCT. The decrease in likelihood of CCT seen with palliative care consultation may be attributed to presumption of poor outcomes in patients for whom palliative care consultation is requested, or that critical care physicians are less likely to account for goals-of-care conversations when billing if they are performed in conjunction with palliative care specialists. It is possible that implicit assumptions regarding poor outcomes for patients with a preexisting DNR in case of cardiac arrest (DNR-CCA) order lead to decreased likelihood of CCT compared to those with full code status. It is likely that occurrence of a cardiac arrest associated with trauma and an increasing number of operative interventions are reflective of a relatively higher level of patient acuity and initial treatment intensity, which might prompt more consistent CCT. The association of documented family meetings with likelihood of CCT suggests that time spent with patients and families in end of life conversations may lead to more consistent CCT, and possibly that these conversations increased the amount of time spent with patients such that CCT was appropriate.

There are 2 possible reasons for lack of documentation regarding CCT: critical care was not provided or CCT was provided and not documented. It is likely that both reasons contributed to missing documented CCT in our ICU. Unfortunately, we are unable to differentiate between these reasons in our data. At our institution, physicians do not bill directly; professional coders interpret our documentation to determine the final bills that are submitted. This may also lead to missed documentation that would be required for critical care billing. In addition, our group has previously described the effect of scribes assisting with trauma documentation, with scribe utilization generating significant increases in charges for nonprocedural documentation for subsequent care codes 99 231 and 99 232, reflecting lower complexity medical decision-making.[6] However, scribe implementation decreased use of 99 291 and 99 292. One hypothesis was that scribes had decreased documentation time to the point that practitioners were no longer able to achieve the required 30 minutes of CCT to use code 99 291. In conjunction with the current work, this would support the idea that the length of family meetings allows for critical care practitioners to meet this time requirement, and intensivists who do not join with palliative care for family meetings do not fulfill the time requirement.

Allocation of health care dollars in the United States is an important issue. In the current climate, with the way dollars are currently allocated, hospitals must account for every dollar and accurate documentation of care provided is essential. Comprehensive and resource-

intensive care in the ICU uses precious resources such as ICU beds, ventilators, critical care nurses, and should be fairly compensated. This includes specialized intensivist critical care, when provided and when appropriate. As described by Lustbader et al, critical care code 99 291 may include time spent in family discussions, provided that the physician is immediately available to the patient, the patient cannot participate in decision-making and therefore, the family discussion is needed to make treatment decisions, and organ failure is ongoing.[9] Physicians must document patient inability to make medical decisions, necessity of the discussion, medically necessary treatment decisions, and that the time spent on this service included discussion of treatment options and goals of care, with exclusion of time spent providing grief or bereavement support.[9] Clearly, we do not advocate for indiscriminate critical care billing when requirements are not met, nor do we advocate for the inappropriate use of family meetings to justify critical care billing. Rather, our findings suggest that physicians may preemptively stop documenting appropriately when a patient death is anticipated and may not recognize services that they are providing as critical care as 66.7% and 76.8% of patients who had no CCT on the day prior to death and day of death did have a family meeting in which these topics were addressed within one day of death.

Although the presence or absence of CCT for a given patient will almost certainly not affect that patient directly, the cumulative effect of absent CCT for many patients can have a substantial financial impact on the institution. Using the 2018 CMS Physician Fee Schedule to estimate potential missed charges using the difference in national payment amounts between critical care code 99 291 and subsequent care code 99 233 (approximately $120) would indicate that potential missed charges for our institution for these patients totaled in excess of $14 000 over the course of 3 years.[10] In terms of work RVUs, 297.5 RVUs would be missed for these patients if subsequent care codes were used instead of critical care codes. Using data presented in Prin et al including the 1.03 million estimated annual ICU admissions after trauma in the United States,[1] the 10.7% mortality rate in that cohort, the percentage of patients in that study whose ICU length of stay was 2 days or greater (at least 75% based on presented interquartile ranges), the percentage of screened patients in our study eligible for CCT on day prior to death and day of death (73.5% and 52.5%), the percentage of patients in our study missing CCT on those days (42.9% and 53.3%), and the charge differential between codes 99 291 and 99 233; total missed charges for 2 days for moribund trauma patients in the United States could total in excess of $5.9 million annually.

While the institutional missed charges are not large on a relative scale, given the overall costs of terminal ICU stays for critically ill patients,[2] we note that CCT was absent for many patients on the day prior to death and the day of death, and it is likely that CCT was also absent on preceding dates. We did not include moribund non-trauma SICU patients, nor did we include patients who remained in the ICU for long periods of time until discharge to LTACs. Therefore, the scope of inconsistent and suboptimal CCT may be several-fold larger than indicated in this study at our institution, and likely nationally as well. These results, from a division with a strong emphasis on optimal documentation and billing practices, should prompt other institutions to review their own critical care documentation quality and should prompt surgical critical care practitioners to make sure that they understand what services do and do not qualify for CCT documentation. Given the findings of our study, the next question is to determine what interventions would improve the likelihood of appropriate

and optimal CCT for trauma patients near end of life in the ICU. One step that may be accomplished by this study is to bring attention to services and required documentation that qualify as critical care and unconscious biases that may reduce likelihood of critical care billing. To improve consistency of critical care documentation at our institution, we plan to implement a standardized critical care co-signature that will include a "CCT" field and example verbiage that would ensure billing criteria are appropriately documented so that exclusion of these will happen only for patients who do not meet criteria for critical care service billing. Standardized templating has previously been shown to increase critical care charge capture for advanced practice providers in surgical ICUs.[10] We believe that further standardization of ICU-attending attestations would be a feasible and cost-effective intervention to improve documentation.

While these results suggest patient and clinical factors that are associated with presence or absence of critical care billing, limitations exist. This is a single-institution retrospective study with a relatively small sample size, and a type II error may exist. To limit the effect of our small sample size on our analysis, we employed a 10-fold cross-validation technique; while the results suggest that other unmeasured variables may also affect the likelihood of CCB, the factors associated with CCB are reliable and stable: trauma arrest, total operations, palliative care consultations, family meetings, and code status at admission. Request for palliative care consultation at our institution is provider-dependent and often occurs in close proximity to death.[7] We theorize that palliative care consultation is called to help transition to comfort measures when it is determined that further care is futile and the intensivist ceases to document CCT. We did not access hospital billing data for this study and could not determine if 99 291 or 99 292 was actually billed, or whether these codes were attributed to other teams, such as palliative care. However, for moribund patients in the ICU, it is likely that billable critical care services are still provided, such as vasopressor and ventilator management. We are unable to determine if a possible impending change in goals of care reduces the intensivist's incentive for time-intensive critical care or reduces the incentive to document CCT. For institutions that regularly consult palliative care specialists or that use a standardized trigger for consultation,[11] the effect of palliative care consultation on CCT may be less notable. It is also possible that physicians who document family meetings more thoroughly are additionally more likely to provide billing documentation. However, occurrence of family meetings was determined through review of all ICU notes, including those written by surgical critical care fellows, residents, and consulting services, so we think it is unlikely that this is related to individual staff documentation.

Conclusions

Intensivists caring for dying trauma patients provide resource-intensive physiologic and palliative care services, which should meet required elements for critical care billing. Despite providing this care, at our institution, trauma surgeon intensivists do not consistently document CCT for trauma patients near the end of life. Admission full code status, trauma arrest, increasing number of operations, and family meetings within one day of death are independent factors that increase the likelihood of CCT documentation, while palliative care consultation is associated with decreased likelihood of CCT documentation. Further quality improvement efforts are necessary to ensure that physicians recognize the services that they

provide, document appropriately, and optimize their contributions to health care system sustainability.

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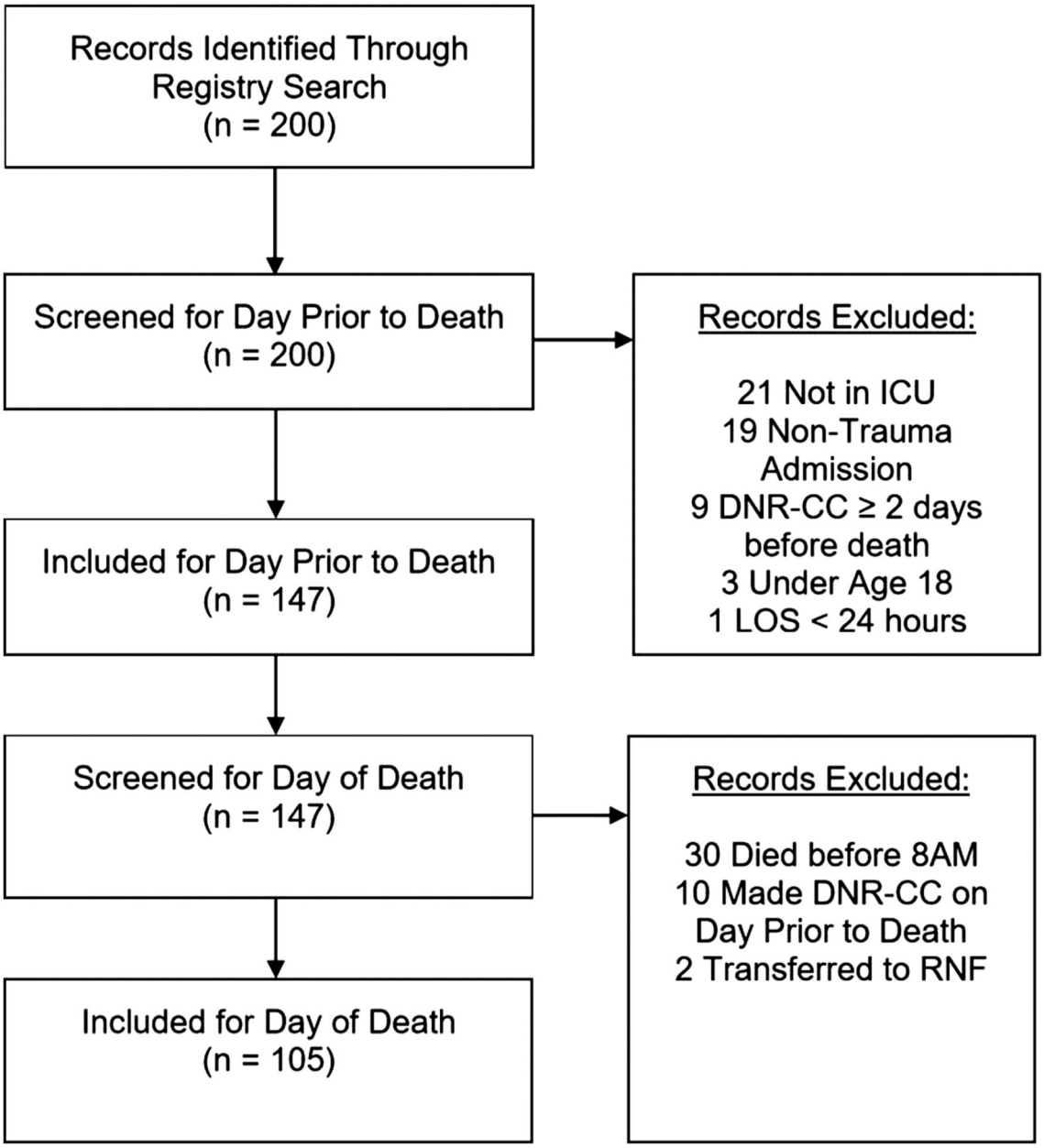

Figure 1.
Flow Diagram Demonstrating Study Population. This figure demonstrates the study population and reasons for study exclusion.

Table 1.

Demographics and Disease Characteristics for Patients on Day Prior to Death (n = 147).[a]

Patient characteristic	All patients (n = 147)	CCT absent (n = 63)	CCT present (n = 84)	*P*-value
Age (years)	68 [55–81]	74 [62–88]	66 [53–75]	<.001
Gender				.096
Female	42 (28.6%)	23 (36.5%)	19 (22.6%)	
Male	105 (71.4%)	40 (63.5%)	65 (77.4%)	
Race				.818
White	125 (85.0%)	53 (84.1%)	72 (85.7%)	
African American	19 (12.9%)	9 (14.3%)	10 (11.9%)	
Other/unknown	3 (2.0%)	1 (1.6%)	2 (2.4%)	
Trauma arrest	15 (10.2%)	3 (4.8%)	12 (14.3%)	.096
Arrival GCS	8 [3–15]	12 [3–15]	7 [3–13]	.034
ISS	26 [20–33]	26 [19–29]	26 [21–36]	.073
Admission code status				.011
Full code	136 (92.5%)	54 (85.7%)	82 (97.6%)	
DNR-I	1 (.7%)	1 (1.6%)	0 (.0%)	
DNR-CCA	10 (6.8%)	8 (12.7%)	2 (2.4%)	
Outcome	**All patients (n = 147)**	**CCT absent (n = 63)**	**CCT present (n = 84)**	***P*-value**
Critical care time (minutes)	30 [0–45]	0	40 [30–60]	<.001
ICU LOS (Days)	7 [4–12]	7 [4–11]	7 [5–12]	.519
Ventilator days	6 [3–10]	5 [0–9]	6 [4–11]	.013
Hospital LOS (Days)	6 [4–12]	6 [3–12]	6 [4–11]	.798
Total operations	1 [0–1]	0 [0–1]	1 [0–1]	.034
Family meeting*	116 (78.9%)	42 (66.7%)	74 (88.1%)	.002
Palliative care consult	57 (38.8%)	34 (54.0%)	23 (27.4%)	.001
Code status at death				.877
Full code	11 (7.5%)	4 (6.3%)	7 (8.3%)	
DNR-I	1 (.7%)	0 (.0%)	1 (1.2%)	
DNR-CC	104 (70.7%)	44 (69.8%)	60 (71.4%)	
DNR-CCA	31 (21.1%)	15 (23.8%)	16 (19.0%)	

Abbreviations: GCS, Glasgow Coma Score; ISS, Injury Severity Score; AIS, Abbreviated Injury Scale; LOS, length of stay; FC, family conversation; CCT, critical care time; DNR-I, Do-Not-Resuscitate, Do-Not-Intubate; DNR-CCA, Do-Not-Resuscitate in case of cardiac arrest; DNR-CC, Do-Not-Resuscitate comfort care.

[a]Data are presented as counts and percentages for categorical variables and medians, respectively, and interquartile ranges for continuous variables. Comparisons were made using Fisher's exact test for proportions of categorical variables and Mann-Whitney U test for non-normally distributed continuous variables.

Table 2.

Demographics and Disease Characteristics for Patients on Day of Death (n = 105).[a]

Patient characteristic	All patients (n = 105)	CCT absent (n = 56)	CCT present (n = 49)	*P*-value
Age (years)	67 [54–77]	67 [55–78]	66 [52–73]	.672
Gender				.372
Female	26 (24.8%)	16 (28.6%)	10 (20.4%)	
Male	79 (75.2%)	40 (71.4%)	39 (79.6%)	
Race				.397
White	89 (84.8%)	46 (82.1%)	43 (87.8%)	
African American	14 (13.3%)	9 (16.1%)	5 (10.2%)	
Other/unknown	2 (1.9%)	1 (1.8%)	1 (2.0%)	
Trauma arrest	12 (11.4%)	4 (7.1%)	8 (16.3%)	.218
Arrival GCS	7 [3–14]	5 [3–13]	9 [3–14]	.354
ISS	26 [21–33]	26 [20–33]	27 [21–34]	.839
Admission code status				.369
Full code	100 (95.2%)	52 (92.9%)	48 (98.0%)	
DNR-CCA	5 (4.8%)	4 (7.1%)	1 (2.0%)	
Outcome	**All patients (n = 105)**	**CCT absent (n = 56)**	**CCT present (n = 49)**	***P*-value**
Critical care time (minutes)	0 [0–35]	0	35 [30–50]	<.001
ICU LOS (Days)	6 [4–11]	7 [4–13]	6 [4–9]	.324
Ventilator days	6 [3–10]	7 [4–13]	5 [3–8]	.058
Hospital LOS (Days)	6 [4–12]	6 [4–12]	5 [4–9]	.325
Total operations	1 [0–1]	1 [0–1]	1 [0–1]	.919
Family meeting	87 (82.9%)	43 (76.8%)	41 (89.8%)	.118
Palliative care consult	39 (37.1%)	26 (46.4%)	13 (26.5%)	.044
Code status at death				.310
Full code	7 (6.7%)	2 (3.6%)	5 (10.2%)	
DNR-I	1 (1.0%)	1 (1.8%)	0 (.0%)	
DNR-CC	77 (73.3%)	44 (78.6%)	33 (67.3%)	
DNR-CCA	20 (19.0%)	9 (16.1%)	11 (22.4%)	

Abbreviations: GCS, Glasgow Coma Score; ISS, Injury Severity Score; AIS, Abbreviated Injury Scale; LOS, length of stay; FC, family conversation; CCT, critical care time; DNR-I, Do-Not-Resuscitate, Do-Not-Intubate; DNR-CCA, Do-Not-Resuscitate in case of cardiac arrest; DNR-CC, Do-Not-Resuscitate comfort care.

[a]Data are presented as counts and percentages for categorical variables and medians, respectively, and interquartile ranges for continuous variables. Comparisons were made using Fisher's exact test for proportions of categorical variables and Mann-Whitney U test for non-normally distributed continuous variables.

Table 3.

Multiple Logistic Regression for Likelihood of CCT, on Day Prior to Death.[a]

Factor	Independent OR	95% CI	*P*-value
Trauma arrest	9.25	1.88–79.80	.015
Total operations	1.72	1.08–2.90	.030
PC consultation	.24	.10–.54	<.001
FC within 1 day of death	3.69	1.45–9.99	.008
Full code at admission	8.01	1.36–86.21	.041

Abbreviations: CCT, critical care time; OR, odds ratio; CI, confidence interval; PC, palliative care; FC, family conversation.

[a]Multiple logistic regression models demonstrating independent effects of clinical factors on likelihood of critical care billing documentation on the day prior to death. This model was constructed using a forward and backward stepwise approach with age, gender, occurrence of a trauma arrest, arrival GCS, ISS, blood product utilization, number of ventilator days, total operations, palliative care consultation, occurrence of bedside family discussions, and occurrence of a family discussion within 1 day of death as inputs. Demonstrated are the results of the best-fit model.