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Impact of Advanced Health Care Directives on Treatment Decisions by Physicians in Patients with Acute Stroke

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Abstract

Background—The implementation of advance health care directives, prepared by almost half of the adult population in United States remains relatively under studied. We determined the impact of advance health care directives on treatment decisions by multiple physicians in stroke patients.

Methods—A de-identified summary of clinical and radiological records of 28 patients with stroke was given to six stroke physicians who were not involved in the care of the patients. Each physician independently rated 28 treatment decisions per patient in the presence or absence of advance health care directives 1 month apart to allow memory washout. The percentage agreement to treat/intervene per patient and proportion of treatment withheld as a group were estimated for each of the 28 treatment decision items. We also determined the interobserver reliability between the two raters (attorneys) in interpretation of 6 items characterizing the adequacy of documentation within the 28 advance health care directives.

Results—The percentage agreement among physician raters for treatment decisions in 28 stroke patients was highest for treatment of hyperpyrexia (100%, 100%) and lowest for intensive care unit monitoring duration based on family-physician considerations outside of accepted criteria

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within institution (68%, 69%) in presence and absence of advance care health directives. The physician rater agreement in choosing “yes” was highest for “routine complexity” treatment decisions and lowest for “moderate complexity” treatment decisions. The choice of withholding treatment in routine complexity,” “moderate complexity,” or “high complexity” treatment decisions was remarkably similar among raters in presence or absence of advance care health directives. The only treatment decision that showed an impact of advance care health directives was intensive care unit monitoring withheld in 32% of treatment decisions in presence of directives (compared with 8% in the absence of directives). Intravenous medication and defibrillation for cardiac arrest was withheld in 29% (compared with 19%) of the treatment decisions in the presence of advance health care directives. The two attorney raters found the description of acceptable outcome inadequate in 14 and 21 of 28 advance health care directives reviewed, respectively. The overall mean kappa for agreement regarding adequacy of documentation was modest (43%) for “does the advance health care directive specify which treatments the patient would choose, or refuse to receive if they were diagnosed with an acute, terminal condition?” and lowest (3%) for “description of acceptable outcome”.

Conclusions—We did not find any prominent differences in most “routine complexity,” “moderate complexity,” or “high complexity” treatment decisions in patient management in the presence of advance health care directives. Presence of advance health care directives also did not reduce the prominent variance among physicians in treatment decisions.

Keywords

Advanced health care directives; stroke; ischemic stroke; intracerebral hemorrhage; disability; patient choice; cardiac resuscitation; patient’s right of determination

Disabilities of various severities in United States are commonly seen in patients with stroke despite, or infrequently as a consequence of, acute treatments.^{1,2} Nearly 1.1 million stroke survivors reported difficulty performing basic activities of daily life in 2005.³ Such disability even of minor severity has been considered an unacceptable outcome by many patients with stroke or adults in the general population.⁴ Painless death was preferred to even a minor stroke disability in over one-third of elderly individuals, whilst 80% would prefer painless death to severe disability; 69% of stroke patients and 82% of adults in general population ranked death as a preferable outcome over severe disability.⁴ In a survey of 68 young adults, almost 60% of surveyed persons were not willing to live with either mild or moderate disability.⁵ Up to a third of patients who survived after undergoing aggressive strategies such as decompressive hemicraniectomy or their families would not have agreed to the procedure after observing the long-term quality of survival.⁵⁻⁷ Patients with acute stroke face a unique challenge because of the sudden onset of incapacitation and need for rapid decision making. Advance health care directives were introduced to reduce the discordance between survivors’ expectation and results of and variations in treatment provided for various diseases. Such directives are prepared by a potential patient and intended to provide specific directives about the course of treatment that is to be followed by health care providers and caregivers in the event that the patient is incapacitated and unable to participate in the decision making process, a scenario commonly seen in stroke patients. Therefore, such directives have particular relevance for stroke patients. We performed this study to identify the impact of existing advance health care directives on treatment decisions within and between physicians involved in care of stroke patients.

METHODS

We identified all patients who were admitted with a diagnosis of ischemic stroke or intracerebral hemorrhage to a comprehensive stroke center over a 12 month period. These

patients were identified from a registry maintained as part of Centers for Disease Control and Prevention Paul Coverdell National Acute Stroke Registry program. Patients age 18 years or greater with documented final clinical diagnosis of stroke on hospital discharges are entered in the registry. At our site, prospective (concurrent) case identification and data abstraction method is used and supplemented by retrospective case identification. An independent audit by the Minnesota Department of Health had demonstrated that the accuracy of final diagnosis of stroke was 100% with a kappa value of 1.0 in the registry at our site. The activities pertinent to the study were conducted under an Institutional Review Board approved protocol. All patients' medical records were reviewed to identify patients who had advance health care directives at the time of admission.

To identify variance in treatment decisions, we provided specific therapeutic choices that were identified based on: 1/. Demonstrated effect on clinical outcome; and 2/. High frequency of use in practice. Such treatment decision items were derived from a previous publication.⁸ Briefly, these treatment decisions were derived from quality care parameters and based on data derived from multi-center randomized trials, and selected non-randomized or observational clinical studies. The current guidelines from the American Heart Association and/American Stroke Association Stroke Council⁹ and The European Stroke Initiative Writing Committee¹⁰ were additionally reviewed to identify treatment decisions that met our criteria. We also reviewed the metrics for measuring quality of care in comprehensive stroke centers that provides a set of metrics and related data elements to measure the key components of specialized care for patients with ischemic stroke and intracerebral hemorrhages at comprehensive stroke centers to identify any additional items.¹¹ A total of 28 treatment decision items were selected and categorized in three categories of decision making based on complexity and risk: 1. Routine complexity, therapeutic interventions that are instituted as part of routine care and do not require any special consideration (informed consent or discussion) prior to implementation; 2/. Moderate complexity, therapeutic interventions for which written consent is not always required or needed, but some meaningful discussion with patient or family is needed; and 3/. High complexity, therapeutic interventions that require informed consent such as surgery, anesthesia, and other invasive procedures.

The items that were included in the "routine" complexity treatment decisions were: 1. Rapid stroke team evaluation; 2. Expedient acquisition of neuroimaging; 3. Treatment of acute hypertensive response; 4. Intensive care unit admission; 5. Intensive care unit monitoring for first 24 hrs; 5. Intensive care unit monitoring duration based on family-physician considerations outside of accepted criteria within institution; 6. Intensive care unit monitoring for as long as patient is candidate based on accepted criteria within institution; 7. Induced hypertension with intravenous vasopressors if appropriate candidate based on accepted criteria within institution; 8. Medical treatment of clinically significant intracranial mass effect or transtentorial herniation; 9. Treatment of repetitive seizures and status epilepticus (clinical or subclinical); 10. Treatment of elevated serum glucose concentration; 11. Treatment of hyperpyrexia; 12. Deep venous thrombosis prophylaxis; 13. Dysphagia screening; 14. Feeding (nutrition) initiation within 72 hours; 15. Treatment of persistently elevated blood pressure after first 24 hrs with oral antihypertensive medication; 16. Treatment of elevated serum glucose concentration; 17. Treatment of hyperpyrexia; and 18. Treatment of hospital acquired or ventilator associated pneumonia. Items that were included in the "moderate" complexity treatment decisions were: 1. Intravenous recombinant tissue plasminogen activator if the patient is an appropriate candidate based on standard criteria; 2. Intubation and mechanical ventilation for non cardiac arrest scenarios; 3. Intubation and mechanical ventilation for cardiac arrest scenarios; 4. Intravenous medication and defibrillation for cardiac arrest scenarios; and, 5. Therapeutic hypothermia if appropriate candidate based on accepted criteria within institution. Items that were included in the

“high” complexity treatment decisions were: 1. Endovascular treatment if appropriate candidate based on accepted criteria within institution; 2. Percutaneous gastrostomy if persistent dysphagia is present; 3. Intracranial pressure monitoring or intraventricular catheter if the patient is an appropriate candidate based on accepted criteria within institution; 4. Craniectomy or craniotomy if appropriate candidate based on accepted criteria within institution; and, 5. Tracheostomy for persistent intubation, or poor airway protection.

A summary document was prepared for each patient with three components: 1/. A summary of clinical presentation, severity of neurological deficits, and presence of co-morbid medical conditions; 2/. One or two representative images of the initial computed tomographic scan; and 3/. A copy of the patient’s advance health care directives. All records were de-identified consistent with the Privacy Rule (45 C.F.R. § 164.514(b)(2)(i))¹² and met the definition of de-identified records provided by the Office of Human Research Protections.¹³ The summary document was independently reviewed and rated by a neurosurgeon, a neuro-intensivist, three vascular neurologists, and another vascular neurologist from Japan. The treatment decisions were presented as a dichotomous choice of whether or not the practitioner (rater) would or would not offer a therapeutic option based on clinical information and review of the advance health care directive document. Each physician rater made the choices for each of the 28 treatment decisions for each patient twice. The first independent review was performed with (in three raters) or without (in three raters) knowledge of the advance health care directives. After a minimum period of 4 weeks (memory washout period), the second review was performed by the same 6 physician raters using a cross over design (3 with and 3 without knowledge of advance health care directives).

To determine adequacy of documentation with particular reference to clarity of expectation regarding acceptable outcomes and specific instructions to guide the treatment decisions, all de-identified advance health care directives were independently reviewed by two attorneys. Both attorneys had expertise in development of training modules for patient outcome assessment and management as part of a clinical trial. The clarity of expectation was compared against the modified Rankin scale. The modified Rankin scale was chosen because of its broad use within the medical community and ability to reliably ascertain the magnitude of disability.¹⁴ Each rater graded the clarity of expectation regarding acceptable outcome as: inadequate, possibly adequate, and definitely adequate. Each rater also graded the advance health care directives in regards to specific instructions for three domains of treatment decision making; routine, moderate, and high complexity. Each domain was graded into one of the four categories; highly specific, moderately specific, somewhat specific, and, non-specific. The two raters further categorized the clarity of instructions for treatment decisions in three categories: 1. All foreseeable treatment scenarios; 2. Some scenarios, or 3. None of the foreseeable scenarios. The adequacy of documentation regarding expectations regarding minimum acceptable quality of life was also categorized into one of three categories: 1. Comprehensive; 2. Subjective; or 3. Poor.

Statistical analysis

The statistical analyses were predominantly descriptive. Each treatment decision was presented as a dichotomous choice, “yes” or “no”. We provided the mean value of 28 values (1 per patient) for each treatment decision representing proportion of physician raters choosing “yes” per patient. For example, we evaluated the proportion of raters who chose “yes” for treatment decision #1 “rapid stroke team evaluation” for patient #1 among all 6 physician raters. All six physician raters chose “yes” to rapid stroke team evaluation and the rate of “yes” for patient #1 was 100%. Subsequently, we evaluated the agreement for treatment decision #1 “rapid stroke team evaluation” for patient #2 among all 6 physician

raters. Four of six physician raters chose “yes” to rapid stroke team evaluation and the rate of “yes” for patient #2 was 67%. Similarly, the rates of “yes” were calculated for each of the 28 patients and mean and standard deviation calculated to provide a single representative value for treatment decision #1. A similar process was repeated when raters chose “yes” in the presence of advance health care directives. If “no” was the predominant response (>50% of choices), the mean value was calculated representing proportion of physician raters choosing “no” per patient. We also calculated the cumulative proportion of times a treatment was withheld for each treatment decision in the presence and absence of advance health care directives separately. This value was calculated for the whole group. The proportion was calculated based on number of “no” decision from a denominator of 168 treatment decisions (1 treatment decision per rater made by six raters for each of the 28 patients). The questions were asked with the intention that a problem was present and choice was to treat/intervene “yes” or not “no”.

We determined the interobserver reliability and the [Kappa] value between the two attorney raters in interpretation of 6 items characterizing the “adequacy of documentation” within the 28 advance health care directives. For example, for each advance health care directive, the item “description of acceptable outcome” was rated by two attorneys as non specific, somewhat specific; moderately specific, or highly specific. The Kappa value represented the agreement for categories chosen for the item “description of acceptable outcome” for the 28 directives. The analysis was performed using SAS 9.1 software (SAS Institute Inc., Cary, NC). The sample size was based on the recommendations provided by Sim and Wright¹⁵ which consider a sample size of 25 patients/observations appropriate to detect a Kappa of 0.5 for 1 tailed test at 80% power. In an exploratory analysis, we reviewed the impact of advance health care directives and percentage agreement in four patients in whom both attorneys agreed that clarity of instructions in the directives was adequate for all foreseeable treatment decision scenarios.

RESULTS

A total of 73 (30.3%) of 241 consecutive patients admitted within a 12 month period with ischemic and hemorrhagic strokes had an advance health care directive. We included 28 consecutive patients from 73 patients with advance health care directives pursuant to our sample size calculation. These 28 patients were selected by a review of consecutively admitted patients with advance health care directives from start of study period including those in whom a full copy of the actual directives document was available within the medical records until the a priori set number of ischemic stroke and intracerebral hemorrhage patients were identified. The percentage agreement among physician raters for choosing “yes” to a treatment decision for 28 stroke patients was highest for treatment of hyperpyrexia (100%, 100%) and deep venous thrombosis prophylaxis (100%, 99%) and lowest for intensive care unit monitoring duration based on family-physician considerations outside of accepted criteria within institution (68%, 69%) in presence and absence of advance care health directives, respectively (see Table 1). Other treatment decision items such as therapeutic hypothermia if the patient was an appropriate candidate based on accepted criteria within institution also had low agreement among physician raters. The rater agreement for choosing “yes” was highest for “routine complexity” treatment decisions and lowest for “moderate complexity” treatment decisions. The rater agreement remained relatively low for “high complexity” treatment decisions.

The treatment decisions or choice of withholding treatment was remarkably similar among raters in the presence or absence of an advance care health directives. Subjectively, the only treatment decision item that showed an impact of presence of advance care health directives was intensive care unit monitoring for as long as patient is a candidate based on accepted

criteria within institution; withheld in 32% compared with 8% of patients in the presence of advance health care directives, respectively. Intravenous medication and defibrillation for cardiac arrest was withheld in 29% (compared with 19%) of the treatment decisions in the presence of advance health care directives. Presence of advance care health directives did not impact decision choices for either “routine complexity,” “moderate complexity,” or “high complexity” treatment decisions. The treatment decision to withhold intracranial pressure monitoring or intraventricular catheter (if the patient was an appropriate candidate) and performance of craniectomy or craniotomy based on accepted criteria within institution demonstrated minimal variation in the presence of advance health care directives.

A determination of adequacy of documentation by the two attorney raters found that description of acceptable outcome was inadequate in 14 and 21 of 28 advance health care directives reviewed, respectively (see Table 2). The specific instructions were considered highly specific in 11 and 10 of the directives reviewed for “routine-complexity” treatment decisions making but only in 2 and 2 for “moderate complexity,” and 4 and 3 for “high complexity” treatment decisions. Whether the advance health care directives specify which treatments the patient would choose or refuse to receive if they were diagnosed with an acute, terminal condition was considered specific for all scenarios in 6 and 9 of the 28 advance care health directives by the two raters. The overall mean kappa for agreement regarding adequacy of documentation was highest (43%) for “does the advance health care directive specify which treatments the patient would choose or refuse to receive if they were diagnosed with an acute, terminal condition?” and lowest (3%) for “description of acceptable outcome.”

The presence of an advanced health care directive impacted several decision items after limiting the analysis to the four patients with advanced health care directives that both attorney raters determined as providing clear instructions regarding all foreseeable treatments (see supplemental material). The decision items that were impacted by advanced health care directives included intensive care unit monitoring, treatment of acute hypertensive response, induced hypertension with intravenous vasopressors (if appropriate candidate based on accepted criteria within institution), feeding (nutrition) initiation within 72 hrs, treatment of hospital acquired or ventilator associated pneumonia, intubation and mechanical ventilation for non-cardiac arrest scenarios, intravenous medication and defibrillation for cardiac arrest, percutaneous gastrostomy if persistent dysphagia, and tracheostomy for persistent intubation, or poor airway protection. The percentage agreement among raters for care item choices for these 4 stroke patients was high for several decision items but was relatively similar in the presence and absence of advance care health directives.

DISCUSSION

In 1990, the Council on Scientific Affairs and the Council on Ethical and Judicial Affairs of the American Medical Association issued a report that highlighted ethical and legal implications of decisions to withhold or withdraw life-prolonging medical treatment.¹⁶ In 1991, the Patient Self-Determination Act enacted by the United States Congress went into effect in all health care facilities receiving Medicare or Medicaid funding.¹⁷ In 1992, the Joint Commission on Accreditation of Health Care Organizations published a section on advance health care directives for health care facilities directly related to the care of the dying patient.¹⁸ After receiving official recognition, advance health care directives were increasingly used among persons with or without chronic terminal diseases to provide specific directives about the course of treatment when they were incapacitated and unable to participate in the decision making process. In theory, advance health care directives would provide an ideal surrogate for in-person decision making and ensuring that treatment

decisions are made under well-defined parameters in patients such as those suffering from acute stroke where incapacitation is very common in the early part of the disease.

Overall, our results did not support the value of advance health care directives as means to influence treatment decisions in stroke patients. The cross over design allowed differentiation between treatment decisions based on patient related factors and those related to presence of advance health care directives. Our study was unable to demonstrate any major change in treatment decisions pertaining to various facets of care among stroke patient in the presence of advance health care directives. Surprisingly, even decision making for “moderate complexity” and “high complexity” treatment decisions was not noticeably influenced by the presence of advance health care directives. We also identified prominent variance among physicians in treatment decisions even in the presence of advance health care directives. There are two possible explanations for these findings. Firstly, advance health care directives in the current format do not provide adequate or specific information to influence medical decision making. It is possible that physician decisions were more likely to be affected if advance health care directives were more explicit. Secondly, physicians do not make treatment decisions based on advance health care directives but rather on clinical factors supplemented by feedback from patients’ families. The choice of treatment decisions such as endovascular treatment for ischemic stroke or performance of craniectomy or craniotomy is influenced to a greater extent by physicians’ clinical assessment. We included 28 consecutive patients from 73 patients with advance health care directives pursuant to our sample size calculation. A larger sample size would have increased our ability to determine minor differences. However, the number of treatment decisions in the review or the number of reviewers would have to be reduced for practical reasons. We chose to provide an in-depth analysis which we thought was more appropriate for an initial study.

We explored the adequacy of documentation using an independent review by two attorney raters who found that the description of acceptable outcome was inadequate in half of the advance health care directives reviewed, and the specific instructions were considered “not specific” in regards to treatment decisions in a large proportion of directives for “moderate complexity” and “high complexity” decisions. The agreement between interpretations of the two attorney raters was poor for most items assessed for determining adequacy of documentation. While it appears that several items in the current format of advance health care directives can be improved upon, it remains unclear whether such improvement will result in a larger impact on medical decision making and ensure greater uniformity in interpretation among physicians. In an exploratory analysis limited to advance health care directives that both attorneys determined that directives provide clear instructions, several decision items showed an impact of presence of advance care health directives. We need to acknowledge that advance health care directives are not disease specific and may lose generalizability if more specific terms are used in the document. The number of raters was too small to assess the differences between physicians and attorneys and the impact of physician specialty in interpretation of the document.

It is important to understand the consequences of treatment decisions evaluated in our study and whether such treatment decisions can lead to unnecessarily prolonged, painful, expensive, and emotionally burdensome care and unacceptable outcomes for both patients and their families. Our study did not look at the impact of such variations in treatment decisions on patient outcome in this patient sample. There is ample data that presence of do-not-resuscitate orders and advance health care directives leads to variation in care and premature withdrawal of care in certain situations.¹⁹⁻²³ There is also evidence that intensity of intensive care unit care reduces mortality among stroke patients²⁴ and even decisions regarding institution of feeding,²⁵⁻²⁷ blood pressure monitoring and intervention,^{28, 29}

intubation and mechanical ventilation,³⁰ medical treatment of intracranial hypertension, and transtentorial herniation,³¹ management of hyperglycemia,³² intravenous antibiotics for treatment of pneumonia,^{33, 34} and gastric ulcer prophylaxis³⁵ lead to alteration in cost of hospitalization, length of stay, and patient outcomes. Certain treatment choices such as endovascular treatment for ischemic stroke and craniectomy/craniotomy for mass effect are likely to result in lower mortality but higher disability.⁵⁻⁷ The low threshold exhibited by patients, families, and healthy population in the community for accepting disability instead of death^{4, 5} would support the assumption that the limited impact of advance health care directives in modifying care and reducing variation in decision making increases the likelihood of “unacceptable outcomes” among patients.

In conclusion, our results mandate steps to provide a clear understanding among patients and attorneys involved in the preparation of advance health care directives regarding the expected impact of the document on actual treatment decisions. Steps such as involvement of physicians in providing professional opinion at the time of preparation of advance health care directives may assist in preparation of a document that guides treatment decisions consistent with patients’ expectations. A greater level of awareness and collaboration among patients, families, legal parties, and physicians may result in implementation of advance health care directives during management of diseases such as stroke which is associated with high rates of surrogate decision making and variation in magnitude of disability and quality of life subsequent to such decisions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Treatment decisions and agreement among independent physician raters in presence or absence of advance health care directives

Treatment decisions	In the presence of advance health care directives		In the absence of advance health care directives	
	Percentage agreement per patient to choose "yes" (mean % $\pm$ standard deviation)	Proportion of times withheld in 168 treatment decisions	Percentage agreement per patient to choose "yes" (mean % $\pm$ standard deviation)	Proportion of times withheld in 168 treatment decisions
<u>Routine complexity treatment decisions</u>				
Rapid stroke team evaluation	96.4 $\pm$ 9.5	3.5	97.0 $\pm$ 6.5	2.9
Expedient acquisition of neuroimaging	99.4 $\pm$ 3.1	0.6	98.2 $\pm$ 5.2	1.7
Any intensive care unit monitoring	86.9 $\pm$ 11.4	13.1	89.8 $\pm$ 10.4	10.1
Intensive care unit monitoring for first 24 hrs	88.6 $\pm$ 12.0	11.3	88.6 $\pm$ 11.2	12.5
Intensive care unit monitoring duration based on family-physician considerations outside of accepted criteria within institution	67.8 $\pm$ 10.1	32.1	69.1 $\pm$ 9.8	32.1
Intensive care unit monitoring for as long as patient is a candidate based on accepted criteria within institution	92.2 $\pm$ 10.6	31.5	91.6 $\pm$ 13.9	8.3
Treatment of acute hypertensive response	92.2 $\pm$ 11.5	7.7	92.8 $\pm$ 10.5	7.1
Induced hypertension with intravenous vasopressors if appropriate candidate based on accepted criteria within institution	75.5 $\pm$ 16.6	25.6	77.9 $\pm$ 18.7	22.0
Treatment of clinically significant intracranial mass effect or transtentorial herniation	78.5 $\pm$ 13.5	25.0	79.7 $\pm$ 17.7	21.4
Treatment of repetitive seizures and status epilepticus (clinical or subclinical)	97.6 $\pm$ 5.9	2.3	98.8 $\pm$ 6.3	1.2
Treatment of elevated serum glucose concentration	98.8 $\pm$ 4.3	1.1	99.4 $\pm$ 3.1	0.6
Treatment of hyperpyrexia	100 $\pm$ 0	0	100 $\pm$ 0	0
Deep venous thrombosis prophylaxis	100 $\pm$ 0	0	98.8 $\pm$ 4.3	1.2
Dysphagia screening	98.8 $\pm$ 4.3	1.2	97.0 $\pm$ 10.2	2.9
Feeding (nutrition) initiation within 72 hrs	90.4 $\pm$ 13.2	9.5	96.4 $\pm$ 8.3	4.7
Gastric ulcer prophylaxis	97.0 $\pm$ 7.9	2.9	96.4 $\pm$ 6.9	3.5
Treatment of persistently elevated blood pressure after first 24 hrs with oral antihypertensive medication	96.4 $\pm$ 8.3	3.5	96.4 $\pm$ 8.3	3.5
Treatment of hospital acquired or ventilator associated pneumonia	94.0 $\pm$ 9.3	5.9	97.0 $\pm$ 9.1	2.9
<u>Moderate complexity treatment decisions:</u>				
Intravenous tissue plasminogen activator if appropriate candidate based	71.1 $\pm$ 17.2	45.2	66.6 $\pm$ 21.8	48.2

Treatment decisions	In the presence of advance health care directives		In the absence of advance health care directives	
on standard criteria [‡]				
Intubation and mechanical ventilation for non-cardiac arrest scenarios	78.5 ± 18.0	21.4	86.3±15.1	13.6
Intubation and mechanical ventilation for cardiac arrest scenarios	75.5 ± 15.3	29.1	77.4 ± 14.5	25.0
Intravenous medication and defibrillation for cardiac arrest scenarios	74.4 ± 16.6	29.1	80.9±15.5	19.1
Therapeutic hypothermia if appropriate candidate based on accepted criteria within institution	67.8 ± 13.5	38.1	72.0 ± 16.4	31.5
High complexity treatment decisions:				
Endovascular treatment if appropriate candidate based on accepted criteria within institution [‡]	80.0 ± 19.1	31.5	83.3 ± 14.0	26.7
Percutaneous gastrostomy if persistent dysphagia	79.2 ± 16.7	22.0	84.5 ± 13.5	16.6
Intracranial pressure monitoring or intraventricular catheter if appropriate candidate based on accepted criteria within institution	77.3 ± 13.0	27.3	76.7 ± 14.5	24.4
Craniectomy or craniotomy if appropriate candidate based on accepted criteria within institution	74.4 ± 12.4	31.5	71.4 ± 14.2	29.7
Tracheostomy for persistent intubation, or poor airway protection	77.3 ± 13.7	33.3	78.4 ± 16.5	25.6

Symbols used:

[‡], only assessed for patients with ischemic stroke

[‡] comparison of choices in presence or absence of advance health care directive by same rater.

Table 2

Results of review of quality and characteristics of documentation of advance health care directives by two independent attorney raters

Items reviewed	Rater #1	Rater #2	Kappa
Description of acceptable outcome [‡]	Inadequate (n=14); possibly adequate (n=9); definitively adequate (n=5)	Inadequate (n=21); possibly adequate (n=6); definitively adequate (n=1)	3.3%
Specific instructions for “routine-complexity” treatment decision making [‡]	Non specific (n=3); somewhat specific (n=3); moderately specific (n=11); highly specific (n=11)	Non specific (n=1); somewhat specific (n=10); moderately specific (n=7); highly specific (n=10)	17.8%
Specific instructions for “moderate-complexity” treatment decision making [‡]	Non specific (n=7); somewhat specific (n=10); moderately specific (n=9); highly specific (n=2)	Non specific (n=10); somewhat specific (n=8); moderately specific (n=8); highly specific (n=2)	9.9%
Specific instructions for “high-complexity” treatment decision making [‡]	Non specific (n=1); somewhat specific (n=10); moderately specific (n=13); highly specific (n=4)	Non specific (n=10); somewhat specific (n=5); moderately specific (n=10); highly specific (n=3)	15.2%
Do the advance health care directives specify which treatments the patient would choose, or refuse, to receive if they were diagnosed with an acute, terminal condition? ^ψ	All scenarios (n=6); some scenarios (n=17); no scenarios (n=5)	All scenarios (n=9); some scenarios (n=14); no scenarios (n=5)	43.2%
Does the advance health care directive articulate what the patient would consider to be the minimum acceptable quality of life? [§]	Comprehensive (n=10); subjective (n=11); poor (n=7)	Comprehensive (n=1); subjective (n=11); poor (n=16)	12.9%

Symbols used:

[‡] Inadequate, the advance health care directives specified acceptable outcome cannot be used to determine the disability on modified Rankin scale; possibly adequate, the advance health care directives specified acceptable outcome does not contain terminology that is similar to modified Rankin scale but contains terminology that can be extrapolated to determine the disability; definitively adequate, the advance health care directive acceptable outcome contains terminology that is similar to modified Rankin scale.

[‡] Highly specific, specific instructions were available for all decision items; moderately specific, specific instructions were available for two or more decision items; somewhat specific, specific instructions were available for at least one decision items; non-specific, specific instructions were available for none of the decision items.

^ψ All scenarios, the advance health care directive provides clear instructions regarding all foreseeable treatments; some scenarios, the advance health care directive provides some instructions regarding some treatments; no scenarios, the advance health care directive does not provide clear instructions regarding all foreseeable treatments.

[§] Comprehensive, the advance health care directive clearly articulated what they considered to be the minimum acceptable quality of life; subjective, the advance health care directive discussed minimum acceptable quality of life in subjective terms; poor, the advance health care directive did not discuss minimum acceptable quality of life.