Original Investigation

The Frequency and Cost of Treatment Perceived to Be Futile in Critical Care

Thanh N. Huynh, MD, MSHS; Eric C. Kleerup, MD; Joshua F. Wiley, MA; Terrance D. Savitsky, MBA, MA, PhD; Diana Guse, MD; Bryan J. Garber, MD; Neil S. Wenger, MD, MPH

IMPORTANCE Physicians often perceive as futile intensive care interventions that prolong life without achieving an effect that the patient can appreciate as a benefit. The prevalence and cost of critical care perceived to be futile have not been prospectively quantified.

OBJECTIVE To quantify the prevalence and cost of treatment perceived to be futile in adult critical care.

DESIGN, SETTING, AND PARTICIPANTS To develop a common definition of futile care, we convened a focus group of clinicians who care for critically ill patients. On a daily basis for 3 months, we surveyed critical care specialists in 5 intensive care units (ICUs) at an academic health care system to identify patients whom the physicians believed were receiving futile treatment. Using a multivariate model, we identified patient and clinician characteristics associated with patients perceived to be receiving futile treatment. We estimated the total cost of futile treatment by summing the charges of each day of receiving perceived futile treatment and converting to costs.

MAIN OUTCOME AND MEASURE Prevalence of patients perceived to be receiving futile treatment.

RESULTS During a 3-month period, there were 6916 assessments by 36 critical care specialists of 1136 patients. Of these patients, 904 (80%) were never perceived to be receiving futile treatment, 98 (8.6%) were perceived as receiving probably futile treatment, 123 (11%) were perceived as receiving futile treatment, and 11 (1%) were perceived as receiving futile treatment only on the day they transitioned to palliative care. The patients with futile treatment assessments received 464 days of treatment perceived to be futile in critical care (range, 1-58 days), accounting for 6.7% of all assessed patient days in the 5 ICUs studied. Eighty-four of the 123 patients perceived as receiving futile treatment died before hospital discharge and 20 within 6 months of ICU care (6-month mortality rate of 85%), with survivors remaining in severely compromised health states. The cost of futile treatment in critical care was estimated at $2.6 million.

CONCLUSIONS AND RELEVANCE In 1 health system, treatment in critical care that is perceived to be futile is common and the cost is substantial.

Invited Commentary page 1894

Author Video Interview at jamainternalmedicine.com

Supplemental content at jamainternalmedicine.com

Author Affiliations: Division of Pulmonary and Critical Care Medicine, Department of Medicine, David Geffen School of Medicine, University of California Los Angeles (Huynh, Kleerup); Institute for Digital Research and Education, Department of Psychology, University of California Los Angeles (Wiley); RAND Health, Santa Monica, California (Savitsky, Wenger); Department of Medicine, David Geffen School of Medicine, University of California Los Angeles (Guse, Garber); Division of General Internal Medicine and Health Services Research, Department of Medicine, David Geffen School of Medicine, University of California Los Angeles (Wenger).

Corresponding Author: Thanh N. Huynh, MD, MSHS, Department of Medicine, Division of Pulmonary and Critical Care Medicine, Box 951690, 37-131 CHS, Los Angeles, CA 90095-1690 (thuynh@mednet.ucla.edu).

JAMA Intern Med. 2013;173(20):1887-1894. doi:10.1001/jamainternmed.2013.10261
Published online September 9, 2013.

Advances in medicine enable critical care specialists to save lives as well as prolong dying. An admission to the intensive care unit (ICU) should be considered a therapeutic trial—aggressive critical care should transition to palliative care once it is clear that the treatment will not achieve an acceptable health state for the patient.[1,2] However, intensive care interventions often sustain life under circumstances that will not achieve an outcome that patients can meaningfully appreciate. Such treatments are often perceived to be "futile" by health care providers.[3] A survey of ICU physicians in Canada found that as many as 87% believed that futile treatment had been provided in their ICU in the past year.[3] In a single-day cross-sectional study performed in Europe, 27% of ICU clinicians believed that they provided "inappropriate" care to at least 1 patient, and most of the inappropriate care was deemed such because it was excessive.[4]

In the United States, critical care accounts for 20% of all health costs and 1% of the gross national domestic product.[5,6] Because approximately 20% of deaths in the United States occur during or shortly after a stay in the ICU, critical care is scrutinized for the provision of potentially futile resource-intensive treatment.[2,7-9] However, information is lacking on the prospective identification of patients who are perceived as receiving futile treatment, factors associated with these perceptions, and the outcomes and costs of the care.

Treatment that cannot achieve a patient's goals or that simply maintains a state such as ICU dependence or permanent coma is contrary to professional values, inappropriately uses health care resources, and creates moral distress.[3,10,11] Nonetheless, the determination of futility is often value laden. We convened a focus group of critical care physicians to establish reasons why treatment might be considered futile. Using these reasons, we surveyed critical care physicians daily during a 3-month period to identify patients whom they perceived to be receiving futile treatment.

Methods

The University of California Los Angeles (UCLA) institutional review board approved the study.

Focus Group

In a focus group, 13 physicians who care for critically ill patients discussed whether and how they provided treatment that they perceived as futile. Two clinicians (T.N.H. and N.S.W.) led the discussion, using open-ended questions. The group consisted of 3 surgeons, 1 anesthesiologist, 1 cardiologist, and 8 pulmonary critical care physicians. Participants were asked to describe patients for whom they had provided ICU treatment that they judged to be futile. They were asked what made them view the treatment as futile, how a case perceived to be futile differed from other cases, and when in the course of treatment they recognized the treatment as futile. Participants were asked to voice agreement or disagreement with whether they perceived specific treatments as futile and to classify the reason for treatment futility. Audiotapes of the discussion were transcribed. When there was consensus, categories of futile treatment were identified.

Survey Instrument

On the basis of the discussion, we developed a questionnaire to identify patients whom physicians perceived as receiving futile treatment in critical care. For each ICU patient under the physician's care, a brief paper-and-pencil questionnaire asked whether the patient was receiving futile treatment, receiving probably futile treatment, or not receiving futile treatment. For patients judged to be receiving futile treatment, the physician was asked to select the reason(s) that the treatment was perceived to be futile from among the reasons derived from the focus group: burdens grossly outweigh benefits, patient will never survive outside an ICU, patient is permanently unconscious, treatment cannot achieve the patient's goals, or death is imminent. Physicians also could write in a reason. The questionnaire was piloted for 1 week to test ease of administration, wording, and content. On the basis of the pilot, an additional reason was added to identify patients who received futile treatment on the day that they transitioned to comfort care.

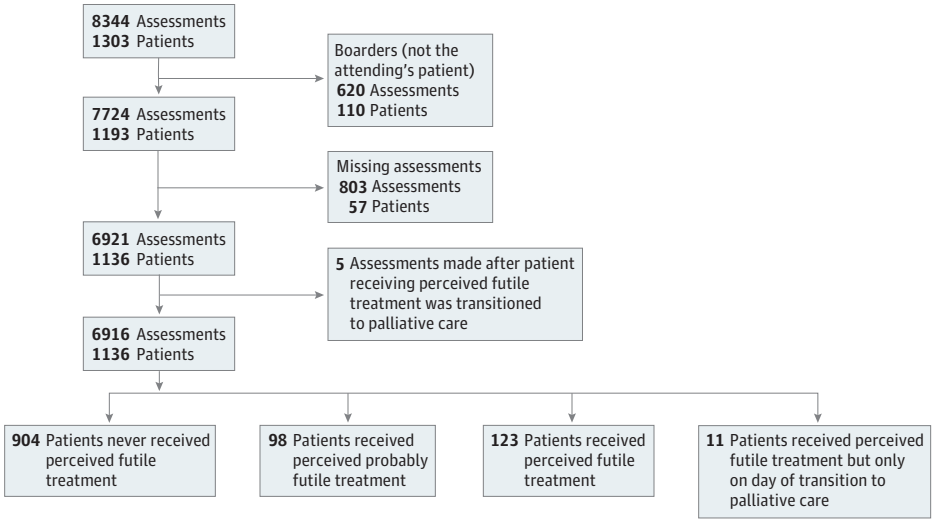
Administration of the Questionnaire

Every day from December 15, 2011, through March 15, 2012, 2 research assistants administered the questionnaire to each attending critical care specialist providing treatment in 5 ICUs in the health system: medical ICU (MICU), neurocritical care unit, cardiac care unit, cardiothoracic ICU, and an academic community hospital mixed-use ICU. The first 4 ICUs are located in 1 quaternary care hospital of an academic medical center. A fifth adult ICU (liver transplant ICU) at the hospital declined to participate. Each day, the research assistant prepopulated patients into the questionnaire for each ICU and approached the critical care physician for an assessment on each patient. Physicians provided assessments only for patients for whom they were responsible for direct patient care (patients "boarding" in the ICU were excluded). Clinicians provided informed consent and completed a questionnaire that asked about demographic characteristics and clinical experience. Patient and physician identifiers were removed before data were stored on encrypted drives.

Data Sources and Statistical Analysis

Patient demographic characteristics including age, sex, ethnicity and race, insurance, and zip code (used to compute distance from the hospital); source of admission; and Medicare Severity Diagnosis-Related Group (MS-DRG) weight were obtained from the hospital. Sources of admission included emergency department, outpatient setting, skilled nursing facility (SNF), long-term acute care (LTAC) facility, and transfer from an outside hospital (usually for a higher level of care). Distance from residence to the hospital was dichotomized at 20 miles (32 km). The MS-DRG weights, determined on the basis of the patients' diagnoses and the resources required during their hospitalization, were used as a measure of severity of illness. We subtracted the date of hospital admission from the date of the physician assessment to create the day of each physician assessment. Clinician characteristics including sex, race,

Figure. Patients and Assessments Included in the Study



and age were obtained from a questionnaire. Hospital and 6-month mortality rate were obtained from electronic medical records and publicly available death records.

Patients were categorized into 3 groups: patients for whom treatment was never perceived as futile, patients with at least 1 assessment that treatment was probably futile but no assessments of futile treatment, and patients with at least 1 assessment of futile treatment. Patients who were assessed as receiving futile treatment only on the day that they transitioned to comfort care were excluded from analysis. Hospital and 6-month mortality rate for the 3 patient groups were compared using analysis of variance. Bivariate differences between the 3 patient groups were evaluated for patient characteristics, ICU unit, and day of assessment using χ^2 tests and *t* tests, as appropriate. Analyses were performed using STATA software, version 12 (StataCorp).

We performed multivariate analysis with the assessment as the analytic unit using a multilevel ordered probit linear mixed effects model that included patient and clinician characteristics. The ordered probit mixed effects model assumes approximately equal effects of the predictors on moving from nonfutile to probably futile treatment and on moving from probably futile to futile treatment. Two sensitivity analyses were conducted by comparing nonfutile treatment assessments with combined probably futile and futile treatment assessments and comparing combined nonfutile and probably futile treatment assessments with futile treatment assessments, which suggested that the proportional hazards assumption was met. Because each assessment was cross-classified by patient and physician, random intercepts for both patients and physicians were included. Models were estimated using the MCMCglmm function in *R,* version 2.15.2 (R Foundation for Statistical Computing). An additional sensitivity analysis was conducted by using a multivariate 2-outcome model comparing nonfutile treatment assessments with combined probably futile and futile treatment assessments. We examined how accurately the model classified futile treatment assessments by comparing the actual assessment with the predicted assessment with the highest probability. We present the average marginal change in a patient's probability of receiving each type of assessment for a 1-unit change in the predictor.

Cost Analyses

Daily and admission charges were obtained from the hospital financial decision support office. To evaluate the total charges for perceived futile treatment, we summed charges for each day that the patient was perceived to receive futile treatment and subsequent unassessed days until the end of the hospitalization (or 3 months after study conclusion, whichever came first). Charges for subsequent unassessed days were only included in the total charges if care on the last day that an assessment was made was perceived as futile. Cost was estimated using the most recent publicly available institution-specific cost-to-charge ratio.[12]

Results

During the 3-month study period, 36 critical care clinicians in 5 ICUs provided care to 1193 patients; these physicians did not treat 110 ICU "boarders." Eight hundred three assessments were not obtained because physicians were too busy or unavailable, resulting in 57 patients with no assessments (4.8%). Of 6921 daily assessments, 5 were omitted from analysis because they were made after a patient was transitioned to palliative care, leaving 6916 assessments of 1136 patients. Of these 1136 patients, physicians perceived that 904 never received futile treatment (80%), 98 received probably futile treatment (8.6%), and 123 received futile treatment (11%) (**Figure**). Eleven patients (1%) (who had 19 assessments) were perceived to have received futile treatment only on the day they were transitioned to comfort care. The resulting analytic sample includes 6897 assessments of 1125 patients. The 904 patients who received no futile treatment were assessed on 4487 days. The

Table 1. Description of All Intensive Care Unit (ICU) Patients Admitted During a 3-Month Period and Receipt of Perceived Futile Treatment[a]

Characteristic	Never Received Futile Treatment (n = 904)	Received Probably Futile Treatment (n = 98)	*P* Value[b]	Received Futile Treatment (n = 123)	*P* Value[b]
Sex, No. (%)					
Male	486 (54)	58 (59)	.31	75 (61)	.13
Female	418 (46)	40 (41)		48 (39)	
Age, median (range), y	63 (15-98)	67 (21-99)	.009	67 (17-99)	.007
Race, No. (%)	678 (75)	74 (67)		87 (71)	
White	678 (75)	74 (67)	.91	87 (71)	.31
Asian	73 (8)	6 (6)	.50	12 (10)	.53
Black	85 (9)	12 (12)	.37	17 (14)	.12
Other	68 (8)	6 (6)	.62	7 (6)	.46
Ethnicity, No. (%)					
Hispanic	155 (17)	17 (17)	.96	17 (14)	.35
Non-Hispanic	749 (83)	81 (83)		106 (86)	
Insurance, No. (%)					
Medicare	352 (39)	44 (45)	.25	52 (42)	.48
Medicaid	90 (10)	9 (9)	.85	15 (12)	.44
Private	117 (13)	13 (13)	.93	14 (11)	.63
HMO	291 (32)	26 (27)	.25	41 (33)	.80
Uninsured	54 (6)	6 (6)	.95	1 (1)	.02
Residence >20 miles (32 km) from hospital, No. (%)	395 (44)	47 (48)	.42	49 (40)	.42
Source of admission, No. (%)					
Outpatient setting	263 (29)	8 (8)	<.001	13 (11)	<.001
Transferred from outside hospital	89 (10)	16 (16)	.047	23 (19)	.003
Transferred from SNF/LTAC facility	21 (2)	8 (8)	.001	12 (10)	<.001
Emergency department	531 (59)	66 (67)	.10	75 (61)	.64
MS-DRG weight, median (range)[c,d]	2.6 (0.6-24.3)	4.7 (0.7-18)	.001	4.1 (0.8-18)	.003
Hospital length of stay,[d] median (range), d	8 (1-303)	18 (1-193)	<.001	15 (1-111)[e]	<.001
Type of ICU in which patient was evaluated, No. (%)					
Medical ICU	148 (16)	37 (38)	<.001	45 (37)	<.001
Neurocitical care unit	214 (23)	22 (22)	.79	27 (22)	.67
Cardiac care unit	127 (14)	5 (5)	.01	6 (5)	.004
Cardiothoracic ICU	231 (26)	10 (10)	.001	11 (9)	<.001
Academic community hospital mixed-use ICU	184 (20)	24 (24)	.34	34 (28)	.06

Abbreviations: HMO, health maintenance organization; LTAC, long-term acute care; MS-DRG, Medicare Severity Diagnosis-Related Group; SNF, skilled nursing facility.

[a] Table excludes 11 patients who were assessed as receiving futile treatment only on the day of transition to palliative care.

[b] Compared with patients who never received futile treatment.

[c] Determined by MS-DRG and how many resources were required to treat that patient during that hospitalization.

[d] Across all hospitalizations.

[e] Because 1 patient was still hospitalized at the end of the study, n = 122.

98 patients who received probably futile treatment had 806 assessments of nonfutile treatment and 277 assessments of probably futile treatment. For the 123 patients who received futile treatment, there were 493 assessments of nonfutile treatment (37%), 370 assessments of probably futile treatment (28%), and 464 assessments of treatment perceived as futile (35%) (range, 1-58 days). Assessments of futile treatment accounted for 6.7% of all assessments.

Reasons Treatment Was Perceived as Futile

The most common reason treatment was perceived as futile was that the burdens grossly outweighed the benefits (58%). This reason was followed by treatment could never reach the patient's goals (51%), death was imminent (37%), and the patient would never be able to survive outside an ICU (36%). Thirty percent of the patients were permanently unconscious. In 1 case, the patient had repeatedly required ICU admission for fluid overload because of extraordinary nonadherence to a regimen of diuretics and fluid restriction. Physicians usually perceived that a patient was receiving futile treatment for multiple reasons (eTable 1 in Supplement). For example, 8 patients had the following 4 reasons in combination: they were permanently unconscious, treatment could not achieve the patient's goals, burdens grossly outweighed benefits, and death was imminent.

Patient and Clinician Factors Related to Perceptions of Futile Treatment

The 1125 patients had a mean age of 62 years, 55% were male, 75% were white, and 17% were of Hispanic ethnicity. In bivar-

Table 2. Estimated Average Marginal Difference in Percent Probability of a Patient Being Perceived as Receiving No Futile Treatment, Probably Futile Treatment, and Futile Treatment

Characteristic	Mean (95% CI), %[a]			*P* Value
	No Futile Treatment	Probably Futile Treatment	Futile Treatment	
Patient sex				
Male	Ref	Ref	Ref	.02
Female	4.10 (0.22 to 7.58)	−1.60 (−2.92 to −0.05)	−2.50 (−4.64 to −0.13)	
Patient age, per decade	−2.57 (−3.84 to −1.31)	1.00 (0.51 to 1.51)	1.57 (0.79 to 2.35)	<.001
Patient race				
White	Ref	Ref	Ref	
Asian	0.16 (−6.30 to 7.10)	−0.15 (−2.62 to 2.61)	−0.01 (−4.00 to 4.12)	.94
African American	−6.06 (−13.03 to 0.24)	2.04 (−0.06 to 4.00)	4.02 (−0.26 to 9.00)	.07
Other	1.59 (−6.09 to 8.64)	−0.72 (−3.81 to 2.15)	−0.86 (−5.00 to 3.73)	.62
Patient ethnicity				
Non-Hispanic	Ref	Ref	Ref	.79
Hispanic	0.65 (−4.59 to 5.77)	−0.29 (−2.25 to 1.80)	−0.36 (−3.43 to 2.89)	
Insurance				
Medicare	Ref	Ref	Ref	
Medicaid	−6.42 (−14.36 to 1.21)	2.18 (−0.34 to 4.56)	4.24 (−0.76 to 9.86)	.09
Private	−3.45 (−10.54 to 3.01)	1.17 (−1.25 to 3.34)	2.28 (−2.03 to 6.96)	.33
HMO	−2.29 (−6.93 to 2.35)	0.85 (−0.94 to 2.52)	1.44 (−1.46 to 4.37)	.33
Uninsured	3.21 (−6.15 to 11.55)	−1.48 (−5.20 to 2.32)	−1.72 (−6.28 to 3.70)	.47
Patient residence >20 miles (32 km) from hospital	−1.81 (−6.22 to 2.12)	0.70 (−0.79 to 2.42)	1.11 (−1.32 to 3.83)	.41
Source of admission				
Emergency department	Ref	Ref	Ref	
Outpatient setting	5.87 (1.50 to 10.10)	−2.53 (−4.51 to −0.59)	−3.34 (−5.75 to −1.02)	.01
Transferred from outside hospital	−2.40 (−7.93 to 3.00)	0.86 (−1.17 to 2.78)	1.55 (−1.76 to 5.26)	.41
Transferred from SNF/LTAC facility	−15.07 (−23.83 to −7.26)	4.43 (2.42 to 6.38)	10.64 (4.61 to 17.38)	<.001
MS-DRG weight	−0.05 (−0.33 to 0.26)	0.02 (−0.10 to 0.13)	0.03 (−0.16 to 0.20)	.77
Hospital day of futility assessment, weeks	−1.99 (−2.36 to −1.60)	0.78 (0.60 to 0.94)	1.21 (0.99 to 1.45)	<.001
Physician sex				
Male	Ref	Ref	Ref	.11
Female	−4.64 (−10.43 to 1.22)	1.75 (−0.44 to 3.90)	2.89 (−0.70 to 6.71)	
Physician age, per decade	−1.01 (−4.09 to 1.89)	0.39 (−0.77 to 1.57)	0.61 (−1.18 to 2.46)	.50
Physician race				
White	Ref	Ref	Ref	
Asian	2.83 (−2.73 to 7.91)	−1.12 (−3.16 to 1.03)	−1.71 (−4.76 to 1.71)	.28
Other	2.28 (−7.51 to 10.90)	−1.12 (−4.83 to 2.91)	−1.16 (−5.79 to 4.82)	.58
ICU type				
Medical ICU	Ref	Ref	Ref	
Neurocritical care unit	5.83 (−5.60 to 16.40)	−2.41 (−6.54 to 2.04)	−3.43 (−9.97 to 3.52)	.32
Cardiac care unit	14.15 (10.03 to 17.76)	−7.16 (−9.27 to −4.86)	−6.99 (−8.69 to −5.19)	<.001
Cardiothoracic ICU	10.78 (4.25 to 16.65)	−4.99 (−8.17 to −2.01)	−5.80 (−9.00 to −2.73)	.01
Academic community hospital mixed-use ICU	0.62 (−4.43 to 5.42)	−0.27 (−2.23 to 1.61)	−0.35 (−3.26 to 2.77)	.78

Abbreviations: HMO, health maintenance organization; ICU, intensive care unit; LTAC, long-term acute care; MS-DRG, Medicare Severity Diagnosis-Related Group; ref, referent; SNF, skilled nursing facility.

[a] Quantities greater than zero indicate a greater probability compared with the reference group.

iate comparisons, compared with patients who were never perceived as receiving futile treatment, patients perceived as receiving probably futile treatment and futile treatment were older; had higher MS-DRG weights; had longer lengths of stay; were more likely to be admitted from an outside hospital, SNF, or LTAC facility; and were more likely to have received care in the MICU (**Table 1**). There were no differences by sex, race, ethnicity, or distance from the hospital.

The multilevel multivariate probit ordinal model (**Table 2**) correctly classified 91% of futility group assessments. Age was the strongest patient predictor; for each decade increase in age, the mean probability for patients to be perceived as receiving

Table 3. Survival During Hospitalization and up to 6 Months After Intensive Care Unit (ICU) Care

Patient Group	Death, No. (%) (N = 1136)	
	In-Hospital	Within 6 mo of ICU Care
Never received futile treatment (n = 904)	42 (4.6)	66 (7.3)
Received probably futile treatment (n = 98)	23 (23)	33 (34)
Received futile treatment (n = 123)	84 (68)	104 (85)
Futile treatment only on day transitioned to palliative care (n = 11)	9 (82)	11 (100)

futile treatment increased by 1.6% (95% CI, 0.79%-2.4%). The mean probability for females to be perceived as receiving futile treatment was 2.5% (95% CI, 0.13%-4.6%) lower than for males. There was no significant difference by race, Hispanic ethnicity, insurance, or MS-DRG weight. Compared with patients admitted from the emergency department, patients transferred from an SNF or LTAC facility were significantly more likely to be perceived as receiving futile treatment. No physician descriptor was a significant predictor of the perception of futile treatment, although patients treated in the MICU were significantly more likely to be perceived as receiving futile treatment than patients in the cardiac care unit or cardiothoracic ICU. Patient and physician random effects were both statistically significant, but the variation accounted for by patient factors was 10 times greater (patient factors, $\sigma^2 = 6.22$; physician factors, $\sigma^2 = 0.54$). Parameter estimates are provided in eTable 2 (in Supplement). The sensitivity analyses of the 2-outcome models did not significantly change the results (data not shown).

Patient Outcomes

As expected, the hospital and 6-month mortality rates were significantly higher for patients perceived as receiving futile and probably futile treatment compared with patients perceived as receiving no futile treatment ($P < .001$) (**Table 3**). Eighty-four of the 123 patients who were perceived as receiving futile treatment (68%) died before hospital discharge, and another 20 died within 6 months of ICU care (6-month mortality rate of 85%). Two patients were referred to hospice and lost to follow-up. One patient remains hospitalized, dependent on life-sustaining treatments. The remaining 16 patients perceived to have received futile treatment were discharged or transferred in severely compromised health states, with 10 patients placed in an LTAC facility maintained on life-sustaining treatment (**Table 4**).

Cost of Futile Treatment in the ICU

The mean cost for 1 day of treatment in the ICU that was perceived to be futile was $4004. For the 123 patients categorized as receiving futile care, hospital costs (ICU and subsequent non-ICU days) for care perceived to be futile totaled $2.6 million. The $2.6 million cost of perceived futile care was 3.5% of the total hospital costs for the 1136 patients in the study.

Table 4. Outcome of Patients Who Were Perceived as Receiving Futile Treatment

Outcome	No. (n = 123)
Died	
During hospitalization	84
After hospital discharge and within 6 mo of intensive care unit stay	20
Total	**104**
Discharged home	
With hospice care, lost to follow-up	2
End-stage liver disease, not transplant candidate, flown internationally to die in patient's home country	1
Total	**3**
Discharged to long-term acute care hospital	
Severe cognitive impairment, bedridden, requiring mechanical ventilation and tube feeding	5
End-stage dementia, requiring tube feeding	2
Amyotrophic lateral sclerosis, unable to communicate, requiring mechanical ventilation and tube feeding	1
Anoxic brain injury, no meaningful communication, bedridden, requiring tube feeding	1
Persistent vegetative state, requiring mechanical ventilation	1
Total	**10**
Discharged to skilled nursing facility	
Severe cognitive impairment, bedridden, requiring tube feeding	2
Chronic disease, bedridden, requiring hemodialysis	1
Untreatable malignant neoplasm, bedridden	1
Total	**4**
Transferred to another hospital	
Extensive cancer refractory to chemotherapy, multiorgan failure	1
Total	**1**
Remained hospitalized	
Bedridden; nonresponsive; requiring mechanical ventilation, hemodialysis, and tube feeding	1
Total	**1**

Discussion

We prospectively identified patients perceived as receiving futile treatment in critical care to avoid post hoc bias in labeling patients receiving treatments that were only later judged to be inappropriate.[13,14] In the critical care units that we studied, we found that treatment that is perceived by physicians to be futile is common: more than 1 in 10 patients received such treatment during their ICU stay. The outcomes of these patients were uniformly poor; two-thirds died during the hospitalization and 85% died within 6 months. "Survivors" of treatment perceived to be futile were often discharged in severely compromised health states that some might perceive to be worse than death, such as being permanently severely neurologically compromised and dependent on life-sustaining machines.[15]

The cost of perceived futile treatment, although sizeable, accounted for only a small percentage of critical care expenditures at the health system during the study period. Some have postulated an unclear economic impact of decreasing futile treatment[16,17]; beds freed up by avoiding futile treatment for

1 patient might be used to provide needed critical care to another patient, as well as other expensive treatments such as organ transplants. Luce and Rubenfeld[17] argued that a reduction in critical care utilization at the end of life would not yield significant cost savings because the number of patients is small and the majority of ICU costs are fixed. Our findings show the substantial cost of perceived futile treatment in critical care.

Our multivariate model provides some insight into which patients were more likely to be perceived as receiving futile treatment. Physicians were more likely to assess patients admitted from an SNF or LTAC facility as receiving futile treatment, suggesting that patients whose health was already sufficiently compromised that they required nursing care were less likely to benefit from critical care. Perceived futile treatment was more common in the MICU. In our institution, patients admitted to the MICU are more likely to have complex medical problems not limited to 1 organ system or amenable to surgical correction (as in specialty ICUs). It is also common for patients not responding to critical care to be transferred to the MICU from other critical care units.

Our study has several limitations. We studied a single health system where resource-intensive treatment is known to be provided[18]; it is unclear whether our findings can be generalized. Also, 1 of the ICUs declined to participate. The responsible critical care physician designated futile treatment. There were no objective criteria; it is likely that the families of many patients would not have agreed with the physician's assessment. We quantitated only the frequency and economic costs of treatment perceived to be futile, whereas the burdens to patients, families, and clinicians also deserve attention. The high mortality rate and severely compromised health states of patients assessed as receiving futile treatment provide our findings with some face validity. However, ratings of futile treatment may result in less aggressive treatment, thus yielding a self-fulfilling prophecy.[19] Ratings of futile treatment inherently include subjective judgments, but the vast majority did include an objective outcome (eg, permanent coma) or a clinical assessment (eg, chance of survival or chance of improving to leave the ICU).

Another limitation is that the multivariate model showed that physician random effects were a significant predictor of futile treatment assessment, after patient characteristics were controlled for. These physician factors could not be identified in the present study and should be further explored. Patient factors, however, were much more strongly associated with assessments of perceived futile treatment than physician factors. Finally, because critical care physicians defined futile treatment, the findings raise the question of why they provided such care. Reasons might include lack of agreement by the family, lack of agreement within the clinical team, or a failure to address end-of-life issues. We were unable to characterize the reasons that treatment perceived as futile was provided.

In summary, in our health system, critical care physicians frequently perceive that they are providing futile treatment, and the cost is substantial. Identifying and quantitating ICU treatment that is perceived as futile is a first step toward refocusing care on treatments that are more likely to benefit patients.

ARTICLE INFORMATION

Accepted for Publication: May 24, 2013.

Published Online: September 9, 2013. doi:10.1001/jamainternmed.2013.10261.

Author Contributions: Drs Huynh and Wenger had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Huynh, Kleerup, Wenger.
Acquisition of data: Huynh, Guse, Wenger.
Analysis and interpretation of data: Huynh, Kleerup, Wiley, Savitsky, Garber, Wenger.
Drafting of the manuscript: Huynh, Kleerup, Wiley, Savitsky, Guse.
Critical revision of the manuscript for important intellectual content: Huynh, Kleerup, Savitsky, Garber, Wenger.
Statistical analysis: Huynh, Kleerup, Wiley, Savitsky.
Obtained funding: Wenger.
Administrative, technical, or material support: Huynh.
Study supervision: Huynh, Kleerup, Wenger.

Conflict of Interest Disclosures: None reported.

Funding/Support: This project was supported by a donation from Mary Kay Farley to RAND Health. Dr Huynh was supported by a UCLA Kennamer Fellowship (supported by the Parvin Foundation) and the National Institutes of Health Loan Repayment Program.

Role of the Sponsor: The funder played no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; or preparation, review, or approval of the manuscript.

Additional Contributions: Beth Tenpas, MBA, and Andrew Kaufman, MBA, supplied UCLA administrative data.

REFERENCES

1. Truog RD, Campbell ML, Curtis JR, et al; American Academy of Critical Care Medicine. Recommendations for end-of-life care in the intensive care unit: a consensus statement by the American College of Critical Care Medicine [published correction appears in *Crit Care Med*. 2008;36(5):1699]. *Crit Care Med*. 2008;36(3):953-963.

2. Esserman L, Belkora J, Lenert L. Potentially ineffective care: a new outcome to assess the limits of critical care. *JAMA*. 1995;274(19):1544-1551.

3. Palda VA, Bowman KW, McLean RF, Chapman MG. "Futile" care: do we provide it? why? a semistructured, Canada-wide survey of intensive care unit doctors and nurses. *J Crit Care*. 2005;20(3):207-213.

4. Piers RD, Azoulay E, Ricou B, et al; APPROPRICUS Study Group of the Ethics Section of the ESICM. Perceptions of appropriateness of care among European and Israeli intensive care unit nurses and physicians. *JAMA*. 2011;306(24):2694-2703.

5. Halpern NA, Pastores SM. Critical care medicine in the United States 2000-2005: an analysis of bed numbers, occupancy rates, payer mix, and costs. *Crit Care Med*. 2010;38(1):65-71.

6. Milbrandt EB, Kersten A, Rahim MT, et al. Growth of intensive care unit resource use and its estimated cost in Medicare. *Crit Care Med*. 2008;36(9):2504-2510.

7. Angus DC, Barnato AE, Linde-Zwirble WT, et al; Robert Wood Johnson Foundation ICU End-Of-Life Peer Group. Use of intensive care at the end of life in the United States: an epidemiologic study. *Crit Care Med*. 2004;32(3):638-643.

8. Goodman DC, Esty AR, Fisher ES, Chang C-H. Trends and variation in end-of-life care for Medicare beneficiaries with severe chronic illness. The Dartmouth Atlas of Health Care Website. 2011. http://www.dartmouthatlas.org/downloads/reports/EOL_Trend_Report_0411.pdf. Accessed December 5, 2012.

9. Cher DJ, Lenert LA. Method of Medicare reimbursement and the rate of potentially ineffective care of critically ill patients. *JAMA*. 1997;278(12):1001-1007.

10. Wilkinson DJ, Savulescu J. Knowing when to stop: futility in the ICU. *Curr Opin Anaesthesiol*. 2011;24(2):160-165.

11. Sibbald R, Downar J, Hawryluck L. Perceptions of "futile care" among caregivers in intensive care units. *CMAJ*. 2007;177(10):1201-1208.

12. Cost Reports. Centers for Medicare & Medicaid Services Website. http://www.cms.gov/Research

-Statistics-Data-and-Systems/Files-for-Order/CostReports/index.html. Accessed October 23, 2012.

13. Ong MK, Mangione CM, Romano PS, et al. Looking forward, looking back: assessing variations in hospital resource use and outcomes for elderly patients with heart failure. *Circ Cardiovasc Qual Outcomes*. 2009;2(6):548-557.

14. Fisher ES, Wennberg DE, Stukel TA, Gottlieb DJ, Lucas FL, Pinder EL. The implications of regional variations in Medicare spending. part 2: health outcomes and satisfaction with care. *Ann Intern Med*. 2003;138(4):288-298.

15. Patrick DL, Starks HE, Cain KC, Uhlmann RF, Pearlman RA. Measuring preferences for health states worse than death. *Med Decis Making*. 1994;14(1):9-18.

16. Curtis JR, Engelberg RA, Bensink ME, Ramsey SD. End-of-life care in the intensive care unit: can we simultaneously increase quality and reduce costs? *Am J Respir Crit Care Med*. 2012;186(7):587-592.

17. Luce JM, Rubenfeld GD. Can health care costs be reduced by limiting intensive care at the end of life? *Am J Respir Crit Care Med*. 2002;165(6):750-754.

18. Dartmouth Atlas of Health Care. End-of-Life Care in California: You Don't Always Get What You Want. April 2013. http://www.chcf.org/~/media/MEDIA%20LIBRARY%20Files/PDF/E/PDF%20EOLWhatYouWant.pdf. Accessed May 18, 2013.

19. Chen YY, Connors AF Jr, Garland A. Effect of decisions to withhold life support on prolonged survival. *Chest*. 2008;133(6):1312-1318.

Invited Commentary

Futile Treatments in Intensive Care Units

Robert D. Truog, MD; Douglas B. White, MD, MAS

The provision of treatments that are perceived to be futile is a major problem in the intensive care unit (ICU), leading to burdens for patients and families, as well as moral distress for caregivers. In this issue of *JAMA Internal Medicine*, Huynh and colleagues[1] report on the perceptions of intensive care physicians about treatment perceived to be futile in 5 intensive care units at an academic health care system. They found that the physicians perceived that the treatment that they are providing is futile or probably futile up to 20% of the time. During a 3-month period, the cost of treatment perceived to be futile was estimated at $2.6 million.

We agree that the perceptions of these critical care physicians are concerning. We urge caution, however, in the interpretation and application of the findings of Huynh et al.[1] With regard to the prevalence of potentially futile treatments, for example, the data were derived from the perceptions of a single physician making a single assessment about futility on each day the patient was in the ICU. We have no idea whether other critical care physicians would have agreed with this assessment, whether other physicians (eg, surgeons, subspecialists) would have concurred with this determination, what opinions other clinicians on the team (eg, nurses, social workers) held about the situation, or—most importantly—the views of the patient and family themselves. This mode of assessment stands in sharp contrast to current recommendations that futility assessments be based on an inclusive process that incorporates the perspectives of all stakeholders.[2]

Related article page 1887

With regard to cost, the authors estimated that the cost of the treatment that was perceived to be futile (ICU and subsequent non-ICU days) represented 3.5% of total hospital costs for the patients in the study. The relevant question, however, is how much money would be saved if these treatments were not provided. Others have shown, for example, that roughly 85% of the costs associated with ICU care are fixed costs that cannot be eliminated unless critical care beds are closed.[3] On the basis of such findings, the true savings of not providing life-prolonging treatment to the patients in the study by Huynh et al[1] who were perceived as receiving futile care are almost certainly less than the amount calculated by the authors. These more modest potential savings should be compared with other potential targets for cost savings (eg, excessive imaging, laboratory testing, prescribing) before the decision is made to prioritize the elimination of potentially futile treatments. Such assessments are controversial and often have divisive effects on clinicians, patients, and families.

We offer 4 suggestions for how clinicians in critical care units should conceptualize and respond to requests for treatment that they judge to be futile or wrong. First, we believe that clinicians should generally avoid using the term *futile* to describe such treatment and instead use the term *potentially inappropriate*. It is exceedingly rare for surrogates in ICUs to request treatments that are strictly futile (ie, stand *no chance* of achieving their intended goal). Instead, disputes generally arise from requests for treatments that stand at least some chance of accomplishing the patient's goal but for which the clinician believes that there are competing ethical considerations that may justify treatment refusal, such as the low likelihood of benefit or the high cost.

Second, from an ethical and legal standpoint, these disputes are often more complicated than they seem. Although in some cases clinicians may believe strongly that it would be wrong to administer the requested treatments, there is ongoing debate about the boundaries of acceptable practice near the end of life. Short of brain death, there are no criteria or rules to which clinicians can appeal to justify decisions to refuse life support, at least when those treatments hold even a small chance of achieving the patient's goals. Even within the medical profession, clinicians vary substantially in their attitudes and practices regarding what sorts of treatments should be provided near the end of life.[4]

An added ethical complexity in critical care is that incapacitated, critically ill patients are vulnerable in different ways than patients in other settings. For example, many critically ill patients are unable to speak for themselves, have no choice regarding who will treat them, and, because of their overwhelming illness, have limited ability to seek out alternative physicians. In contrast, in ambulatory practice and many other