Intensive Care Med (2012) 38:404–412
DOI 10.1007/s00134-011-2400-4

ORIGINAL

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Association between education in EOL care and variability in EOL practice: a survey of ICU physicians

Received: 5 November 2010
Accepted: 29 August 2011
Published online: 6 January 2012

This article is discussed in the editorial available at: doi: 10.1007/s00134-011-2432-9.

Electronic supplementary material
The online version of this article (doi:10.1007/s00134-011-2400-4) contains supplementary material, which is available to authorized users.

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Abstract *Purpose:* This study investigated the association between physician education in EOL and variability in EOL practice, as well as the differences between beliefs and practices regarding EOL in the ICU. *Methods:* Physicians from 11 ICUs at a university hospital completed a survey presenting a patient in a vegetative state with no family or advance directives. Questions addressed approaches to EOL care, as well physicians' personal, professional and EOL educational characteristics. *Results:* The response rate was 89%, with 105 questionnaires analyzed. Mean age was 38 ± 8 years, with a mean of 14 ± 7 years since graduation. Physicians who did not apply do-not-resuscitate (DNR) orders were less likely to have attended EOL classes than those who applied written DNR orders [0/7 vs. 31/47, OR = 0.549 (0.356–0.848), $P = 0.001$]. Physicians who involved nurses in the decision-making process were more likely to be ICU specialists [17/22 vs. 46/83, OR = 4.1959 (1.271–13.845), $P = 0.013$] than physicians who made such decisions among themselves or referred to ethical or judicial committees. Physicians who would apply "full code" had less often read about EOL [3/22 vs. 11/20, OR = 0.0939 (0.012–0.710), $P = 0.012$] and had less interest in discussing EOL [17/22 vs. 20/20, OR = 0.210 (0.122–0.361), $P < 0.001$], than physicians who would withdraw life-sustaining therapies. Forty-four percent of respondents would not do what they believed was best for their patient, with 98% of them believing a less aggressive attitude preferable. Legal concerns were the leading cause for this dichotomy. *Conclusions:* Physician education about EOL is associated with variability in EOL decisions in the ICU. Moreover, actual practice may differ from what physicians believe is best for the patient.

Keywords EOL care · Critical care · Education · Brazil

Introduction

End-of-life (EOL) care is an increasingly important issue in critical care medicine [1–5]. A change in priority towards providing comfort care at the EOL may contradict traditional intensive care unit (ICU) goals, which are focused mainly on curative/restorative care. End-of-life decisions are more than simple technical choices, and involve a complex relationship between physicians, who have to select appropriate treatments, and patients/families, with specific wishes and preferences. End-of-life care varies dramatically among physicians, hospitals and countries [4]. This variability may be related in part to different EOL situations, as well as to diversity in

individual values and preferences for EOL care. Some of the variability in EOL practices may also be related to different degrees of physician training and education on EOL issues. This aspect may present an important option to improve EOL care as education is potentially modifiable, yet this topic has rarely been addressed in investigative ICU studies.

One of the greatest challenges during EOL care is to avoid over-treatment, which prolongs suffering, but at the same time, to avoid premature decisions to withdraw treatment, which could lead to potentially avoidable deaths [5]. In such circumstances, physicians may feel compelled, by reasons other than purely medical factors, to be more aggressive than their beliefs would have them be, trending to over-treatment. This dichotomy between attitudes and beliefs can be wider in countries, such as Brazil, where the legality of withdrawal of life-sustaining therapies (LST) during the end-of-life is not consensual among jurists, often misinterpreted by the general public and many healthcare professionals [6], and scarcely debated by the society. Such a dichotomy has not been investigated during EOL care in the ICU, yet may be a major concern.

We therefore sought to investigate the association between physicians' education and training in EOL issues with the variability in EOL care for an ICU patient with a poor prognosis. We also hypothesized that, during EOL care, some physicians do not actually do what they really believe would be best for the patient and sought to quantify this dichotomy by evaluating the major factors implicated in it.

Methods

After Ethics Committee approval, a questionnaire was personally delivered to all ICU staff physicians from the 11 ICUs of a tertiary university teaching hospital during a 5-month period (February–June 2009). Physicians were asked to complete the questionnaire in private and return it anonymously into a sealed box. To minimize instrument bias, a questionnaire was translated and adapted from a prior study [7]. A pilot study was conducted, and input from five specialists in different areas of knowledge (intensive care medicine, ethics and medical education) led to modifications in the questionnaire (Supplementary material).

The first part of the questionnaire presented a case scenario with questions related to EOL care. The case scenario consisted of a patient in a vegetative state because of anoxic encephalopathy after cardiac arrest, with no family or advance directives. We analyzed three main aspects of EOL care: use of a do-not-resuscitate (DNR) order (written DNR orders, only verbal DNR orders or no DNR orders); whether the decision-making process was conducted using a multiprofessional approach (decisions with the involvement of physicians and nurses, decisions taken only by physicians, or decisions referred to the ethical committee or court); and what approach to LST would be taken if the patient developed septic shock ["full code" (maintaining ventilation and starting antibiotics and vasopressors), "withholding" (maintaining ventilation and starting antibiotics but no vasopressors or other interventions), or "withdrawal" (ensuring analgesia and comfort, setting the ventilator to minimal parameters and not initiating other interventions; or ensuring analgesia and comfort and extubating)]. Participants were then asked what approach they believed would be best for the patient, given the same alternatives to choose from. The reasons for any differences in responses was also assessed (to preserve life at any cost, decision guided by quality-of-life, by availability of beds, by costs, by legal reasons or others).

The second part of the questionnaire addressed the personal, professional and EOL educational characteristics of the physicians. Personal characteristics studied were age, sex, interest in discussing EOL issues, perception about problems related to EOL care, religion and belief in God. Professional characteristics included years since graduation, the physician's role in the ICU, type of ICU (mainly medical or mainly surgical), work hours per week spent in the ICU, work primarily within the ICU versus other settings and medical specialty. Educational characteristics were addressed in five questions specifically related to education in EOL issues. Physicians were asked whether they had ever attended classes or discussions about EOL care; whether they had ever attended classes or discussions about communication at the EOL; whether they had ever attended classes or discussions about ethics and legal issues related to EOL situations; how many times they had read articles or texts related to EOL issues in the ICU during the last year (never, once, two or three times, four to six times, or more than six times); how many times they had participated in courses or seminars related to EOL issues in the ICU in the last year (never, once, two or three times, four to six times or more than six times); and, finally, what grade, on a scale from zero (no knowledge) to ten (full knowledge), would they give to their knowledge about EOL care.

Data normality was assured using the Kolmogorov-Smirnov model. Data are presented as means and standard deviations. The univariate analyses were performed using Student's t test and one-way analysis of variance (one-way ANOVA) as appropriate. Categorical data were analyzed through chi-square or Fisher's exact tests. The significance level was $P < 0.05$. The post hoc analyses were performed with the Tukey's test to one-way ANOVA and chi-square or Fisher's exact tests for categorical data. Multivariate analyses were performed with a polytomous logistic regression when there were three dependent variables (professionals involved, DNR

documentation and approach to EOL care), and with a binary logistic regression with likelihood ratio backward elimination of dichotomous variables (comparison between actual and believed best approaches to EOL care). Probabilities of 0.05 and 0.10 were used as entry and removal criteria respectively in the backward elimination of binary logistic regression. To select variables from the univariate analyses for the polytomous logistic regression a $P < 0.25$ was used, and for the logistic binary regression a $P < 0.1$ was used in order to avoid excessive independent variables. Single colinearity among the variables was considered with a Pearson coefficient >0.85 and multi-colinearity was considered with a variance inflation factor >2.5. Statistical analyses were performed using the commercial package SPSS 17.0 for Windows (Chicago, IL, USA).

Results

Of 118 physicians assigned to the 11 ICUs studied, 107 returned the questionnaire. One was returned unanswered, and one could not be analyzed due to printing problems. The main characteristics of the 105 physicians who responded (response rate 89%) are shown in Table 1.

Ninety-three of the respondents (89%) said they would apply written or verbal DNR orders. These physicians were more likely to have intensive care as their main activity, to report having read two or more articles about EOL care in the year preceding the study and to have a higher self-attributed knowledge of EOL issues than physicians who would not apply DNR orders. Physicians who said they would make written orders were younger, more recently qualified and more likely to have attended courses in EOL care or communication than physicians who applied verbal DNR orders (Table 2). In multivariate analysis, more recent time since graduation remained a significant factor in the likelihood of making a written compared to a verbal DNR order, and attendance of classes in EOL care remained significant for making a written order versus no order (Table 2).

Only 22 of the respondents (21%) said they would involve nurses in the decision-making process (Table 3). In multivariate analysis, younger age and ICU as the main specialty were factors associated with an increased likelihood of involving nurses in the decision-making process.

The majority of respondents (63/105, 60%) said they would withhold LST if the patient developed septic shock, 22 (21%) said they would apply full code management, and 20 (19%) would withdraw (Table 4). Physicians who had intensive care as their main specialty and who had read four or more articles related to EOL care in the last year were more likely to withdraw LST than withhold or give full-code. In logistic regression analysis, reading at least four articles about EOL care in the last year and an interest in discussing EOL issues were retained as significant factors in the likelihood to withdraw LST compared to applying full-code (Table 4). An interest in discussing EOL issues was also retained as a significant factor in the likelihood of withdrawing LST compared to withholding LST.

Forty-six of the 105 respondents (44%) had discordant answers to the questions about how they would most likely manage the patient if septic shock developed and what they really believed would be best for the patient (Fig. 1a). Among these, 45 (98%) believed that the best approach for the patient would be to use less invasive supportive measures than they said they would actually use. The number of respondents who said they would withdraw LST increased from 20 (19%) to 42 (40%) when asked what they believed was best for the patient ($P < 0.01$) compared to what they would actually do, whereas the number of respondents that chose full code decreased from 22 (21%) to 11 (10%) ($P = 0.037$). The main reasons given for the disparities between what physicians said they would do and what they believed was best for the patient are shown in Fig. 1b.

Table 1 General characteristics of respondents

Characteristics	Whole group ($n = 105$)
Working in a medical ICU, *n* (%)	44 (42)
Age (years), (mean ± SD)	38 ± 8
Male gender, *n* (%)	68 (65)
Years since graduation (mean ± SD)	14 ± 7
ICU routine visitor, *n* (%)	11 (11)
Work hours/week in ICU (mean ± SD)	36 ± 21
ICU as the main activity, *n* (%)	65 (63)
ICU specialty, *n* (%)	63 (60)
Another specialty, *n* (%)	96 (91)
EOL classes, *n* (%)	50 (62)
Communication classes, *n* (%)	47 (45)
Law or ethics classes, *n* (%)	57 (54)
EOL articles, *n* (%)	
2 or more articles read/1 year	64 (61)
4 or more articles read/1 year	28 (27)
EOL education courses, *n* (%)	
1 or more courses/1 year	50 (48)
2 or more courses/1 year	19 (19)
Interest in discussing EOL, *n* (%)	98 (93)
Find problems related to EOL, *n* (%)	85 (81)
Self-attributed knowledge (mean ± SD)	5 ± 2
Belief in God, *n* (%)	79 (75)
Religiosity, *n* (%)	75 (71)

ICU intensive care unit

Discussion

This study shows that variability in EOL care in the ICU is associated with differences in physicians' characteristics. More recent graduation and greater attendance of classes in EOL care were associated with a greater

Table 2 Univariate and polytomous logistic regression of documentation of do-not-resuscitate (DNR) orders in the clinical situation evaluated in the questionnaire according to physicians' characteristics

Characteristics	Univariate analysis				Polytomous logistic regression: written orders as reference group			
	DNR orders[a]				Odds of applying only a verbal DNR order		Odds of not applying a DNR order	
	Written orders ($n = 47$)	Verbal orders ($n = 46$)	No DNR order ($n = 7$)	P value	OR (CI 95%)	P value	OR (CI 95%)	P value
Working in a medical ICU, n (%)	23 (49)	20 (43)	1 (14)	0.226	1.274 (0.448–3.620)	0.637	3.634 (0.249–53.113)	0.346
Age (years), (mean ± SD)	38 ± 7[c]	42 ± 8	41 ± 8	0.010	–[b]	–	–[b]	–
Years since graduation, (mean ± SD)	13 ± 7[c]	17 ± 7	17 ± 7	0.010	1.127 (1.033–1.230)[g]	0.007	1.172 (0.920–1.494)[g]	0.198
ICU as the main activity, n (%)	31 (66)	29 (63)	2 (28)[d]	0.153	1.774 (0.545–5.769)	0.341	0.534 (0.016–17.887)	0.726
EOL classes, n (%)	31 (66)[e]	16 (35)	0 (0)	0.001	0.549 (0.208–1.451)	0.272	0.549 (0.356–0.848)	0.001
Communication classes, n (%)	30 (64)[e]	15 (33)	1 (14)	0.002	0.471 (0.122–1.819)	0.275	0.332 (0.008–13.648)	0.270
Law or ethics classes, n (%)	30 (64)	22 (48)	1 (14)	0.102	0.691 (0.188–2.546)	0.579	2.110 (0.040–111.024)	0.712
EOL reading, n (%)								
2 or more articles read/1 year	35 (74)	23 (50)	3 (43)[d]	0.044	0.364 (0.009–1.398)	0.141	2.033 (0.131–31.631)	0.612
EOL education courses, n (%)								
1 or more courses/1 year	27 (57)	19 (41)	1 (14)	0.088	0.734 (0.226–2.385)	0.607	0.145 (0.007–2.916)	0.207
Self-attributed knowledge, (mean ± SD)	6 ± 2	5 ± 2	3 ± 2[f]	0.076	0.923 (0.654–1.304)	0.650	0.462 (0.166–1.285)	0.462
Belief in God, n (%)	33 (70)	36 (78)	6 (86)	0.239	1.053 (0.328–3.382)	0.931	1.154 (0.963–1.489)	0.997

All characteristics included in Table 1 were tested; however, only the characteristics with $P < 0.25$ in the univariate analysis are shown in this table

[a] Five physicians did not answer this question

[b] Age was not inserted in the multivariate analysis because the variance inflation factor was 16.6 and 16.4 to age and years since graduation respectively when both were inserted concomitantly. When age was deleted all variance inflation factors were < 2.5

[c] Tukey's post-hoc analysis $P < 0.05$ versus verbal order, and $P < 0.05$ versus no DNR order

[d] Fisher's exact test post-hoc analysis $P < 0.05$ versus written orders, and $P < 0.05$ versus verbal orders

[e] Fisher's exact test post-hoc analysis $P < 0.05$ versus verbal orders, and $P < 0.05$ versus none

[f] Tukey's post-hoc analysis $P < 0.05$ versus written orders, and $P < 0.05$ versus verbal orders

[g] Per year

Table 3 Univariate and multivariate analysis of physicians' characteristics for the decision-making process

Characteristics	Decision-making process						
	Univariate analysis			Multivariate analysis: involvement of nurses as reference group			
	Physician and nurses[a] ($n = 22$)	Alone, among physicians or outside ICU[b] ($n = 83$)	*P* value	OR[c]	CI 95%	*P* value	VIF
Age (years), (mean ± SD)	38 ± 7	40 ± 8	0.204	0.926[d]	0.858–0.998	0.045	1.093
Work hours/week in ICU, (mean ± SD)	47 ± 18	36 ± 22	0.196	–	–	–	1.183
ICU specialty, *n* (%)	17 (77)	46 (55)	0.063	4.195	1.271–13.845	0.013	1.263
Interest in discussing EOL, *n* (%)	22 (100)	76 (92)	0.232	0.895	0.689–1.369	0.756	1.015
Belief in God, *n* (%)	14 (64)	65 (78)	0.128	3.210	0.965–9.987	0.084	1.020

Only characteristics cited in Table 1 with $P < 0.25$ in the univariate analysis are shown in this table. *CI 95%* 95% confidence interval

VIF Variance inflation factor

[a] Physician and nurses means that the decision would be made with the involvement of both physicians and nurses

[b] Outside ICU means that the decision-making process would be performed with ethics committee or court support

[c] OR denotes odds ratio related to the chance of involving nurses in the decision-making process

[d] Per year

likelihood of applying a written DNR order. Similarly, younger age and ICU as the main activity were associated with a greater likelihood of involving nurses in the decision-making process, and reading more articles related to EOL care and being an ICU specialist were associated with an increased likelihood of withdrawing LST in the presented scenario.

Only 21% of the physicians reported that they would involve nurses in the decision-making process. Other studies have reported similarly low rates of multiprofessional participation in EOL decisions in countries such as Argentina (6%) [8], the US (29%), Southern Europe (32%), Brazil (38%), Japan (39%), Turkey (41%) [9] and France (27%) [12]. In contrast, other regions have noted higher rates of nurse involvement, including New Zealand (78%) [10], Lebanon (74.5%) [11], and northern or central Europe (62%) [9]. Previous studies have found that perceptions about when futile care should be provided may differ between physicians and nurses [12]; discrepancies also exist regarding whether or not the EOL decision-making process is satisfactory [13]. The present study does not enable us to elucidate why younger physicians and ICU specialists more often involved nurses in the decision-making process. However, this finding may reflect the increasing recognition by intensivists that effective teamwork is essential to provide optimal patient care in the ICU [14].

Geographical variability regarding attitudes toward LST at the EOL has been widely shown. Withdrawal of LST has been shown to be more prevalent in countries like Canada, northern Europe, central Europe [9] and Australia [15], whereas withholding LST is more prevalent in countries like Turkey, Japan, Brazil, the US, Argentina and southern Europe [8, 9]. Other factors have also been reported to be associated with decisions to forego life support, including patient characteristics (for example, age [15], illness severity, chronic health conditions, patient wishes, influence of past and future quality-of-life [16]), and hospital or ICU characteristics (for example, number of nurses per bed, availability of an emergency department in the same hospital, presence of a full-time ICU specialist, and presence of doctors during nights and weekends [17]). However, the impact of physician characteristics on clinical practice has been less well studied [18–20]. Personal and professional characteristics, like gender, working more often in the ICU [21], years since medical graduation [21, 22], and even the individual intensivist [23] or his/her religious beliefs [24], have been associated with differences in EOL decision-making. Studies conducted in non-ICU settings have found associations between EOL patient management and physicians' educational training [25, 26] or knowledge [27] of EOL care. However, to our knowledge, no studies have previously investigated the association between education in EOL care and variability in EOL management in the ICU setting. To investigate this specific

Table 4 Univariate and polytomous logistic regression of the most likely approach to EOL management in the clinical situation evaluated in the questionnaire according to physicians' characteristics

Characteristics	Univariate analysis				Polytomous logistic regression: withdrawal of LST as reference group			
	Likely EOL attitude				Odds of proceeding as full code		Odds of withholding LST	
	Full code ($n = 22$)	Withholding ($n = 63$)	Withdrawal ($n = 20$)	P value	OR[a] (CI 95%)	P value	OR[a] (CI 95%)	P value
Age (years), (mean ± SD)	42 ± 8	38 ± 7	41 ± 9	0.117	–[b]	–	–[b]	–
Years since graduation, (mean ± SD)	17 ± 7	14 ± 7	16 ± 8	0.117	1.038 (0.936 –1.152)[c]	0.482	0.973 (0.893 –1.060)[c]	0.532
ICU routine visitor, n (%)	2 (9)	4 (6)	5 (25)	0.058	0.761 (0.088 –6.519)	0.804	0.314 (0.057 –1,060)	0.185
Work hours/week in ICU, (mean ± SD)	36 ± 25	34 ± 19	45 ± 20	0.149	1.005 (0.961 –1.052)	0.823	0.991 (0.954 –1,029)	0.627
ICU as the main activity, n (%)	12 (54)	36 (57)	17 (85)[d]	0.026	0.194 (0.024–1.555)	0.170	0.309 (0.051–1.872)	0.289
EOL reading, n (%)								
4 or more articles read/1 year	3 (13)	13 (21)	11 (55)[d]	0.042	0.093 (0.012–0.710)	0.012	0.347 (0.088–1.370)	0.067
EOL education courses, n (%)								
2 or more courses/1 year	5 (23)	7 (11)[e]	7 (35)	0.004	5.819 (0.570 –59.419)	0.137	1.004 (0.195 –5.164)	0.996
Interest in discussing EOL, n (%)	17 (77)[a]	61 (97)	20 (100)	0.050	0.210 (0.122–0.361)	< 0.001	0.189 (0.120–0.299)	< 0.001
Self-attributed knowledge, (mean ± SD)	5 ± 2	5 ± 2	6 ± 2	0.808	0.842 (0.547 –1.267)	0.392	1.033 (0.734 –1.454)	0.852

All characteristics included in Table 1 were tested; however, only the characteristics with $P < 0.25$ in the univariate analysis are shown in this table

[a] Fisher's exact test post-hoc analysis $P < 0.05$ versus withholding and $P < 0.05$ versus withdrawal

[b] Age was not inserted in the multivariate analysis because the variance inflation factor was 14.7 and 14.8 to age and years since graduation respectively when both were inserted concomitantly. When age was deleted all variance inflation factors were <2.5

[c] Per year

[d] Fisher's exact test post-hoc analysis $P < 0.05$ versus withholding and $P < 0.05$ versus full code

[e] Fisher's exact test post-hoc analysis $P < 0.05$ versus withdrawal

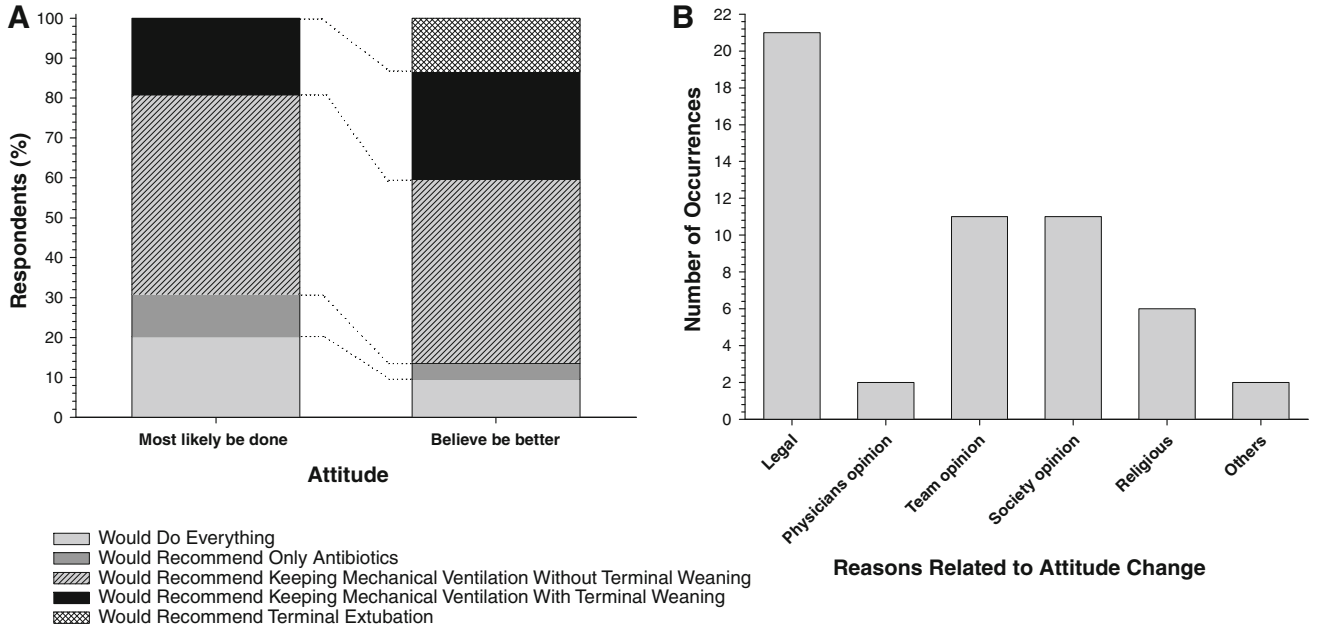

Fig. 1 Actual and believed best treatment for a patient in a vegetative state who develops septic shock. **a** Shows the actual approach (most likely to be done) and the approach believed to be best for the patient. Forty-five physicians (43% of all respondents) believed it would be better to be less aggressive in their treatment (3, 7 and 2 physicians changed from would do everything to terminal weaning, keeping mechanical ventilation without terminal weaning and only antibiotics, respectively; 1, 3 and 5 physicians changed from only antibiotics to terminal extubation, terminal weaning and keeping mechanical ventilation without terminal weaning, respectively; 5 and 11 physicians changed from mechanical ventilation without terminal weaning to terminal extubation and terminal weaning, respectively; 8 physicians changed from terminal weaning to terminal extubation). One physician believed it would be better to be more aggressive and changed from terminal weaning to would do everything. **b** Shows the reasons reported for the difference in approach of the 46 physicians. "Others" denotes three physicians who queried the timing of the EOL decision. There are 52 occurrences because 5 physicians chose 2 reasons and 1 physician chose 3 reasons to justify the attitude change

association, we chose to minimize potentially confounding factors, such as geographical differences and family and patient preferences, by using a simplified case scenario questionnaire in a single hospital. Our finding of an association between education and practice may be important for improving EOL care because it is potentially modifiable. However, we cannot infer causality from our data, and further studies evaluating possible educational interventions are necessary. A recent interventional study did not find an improvement in the quality of dying or changes in withdrawal of life-sustaining measures after an educational intervention was applied [28]; the authors concluded that improving EOL care in the ICU would require interventions with more direct contact with patients and family.

Another significant finding from our study is that what physicians said they would do differed in 44% of cases from what they believed was best for the patient. Almost all these physicians believed that a less aggressive attitude would be preferable. Legal concerns, followed by team and societal opinion, were the most common obstacles to following the course of action believed to be best. Previous findings have also suggested a wide disparity between beliefs and practices [29, 30]. Local legal restrictions regarding the withdrawal of aggressive support were cited as a barrier to withdrawing therapies in a worldwide survey [31], and have also been reported as an important barrier in India [32] and Brazil [6]. Fears of prosecution may limit such decisions because many doctors believe that withdrawal of life support can be considered illegal, whereas withholding therapy would have no legal consequences [33]. In some countries, like the USA, withdrawal of life support has been the object of discussion in medical and legal settings since 1976 [1]. In other countries, such as France [34], Italy [35] and Spain [36], where the law related to withdrawal of LST at the EOL is unclear, the debate is increasing and leading to important changes. In Brazil, legal and ethical codes remain uncertain, increasing fear of prosecution for many professionals [37]. Despite these concerns, withdrawal and withholding of LST are increasingly reported EOL practices in Brazil [3], and in some circumstances, even desired by families [38]. In 2010, Brazil's Federal Council of Medicine included palliative care as an option during EOL care in its Ethical Code [39] and, recently, ethical statements have addressed the possibility of withdrawal of LST in EOL situations [37]. Our study provides evidence that these legal concerns may compel

physicians to have a more aggressive attitude during EOL care, despite their beliefs that this approach may not be best for the patient. This observation raises some concerns about whether Brazilian's legal standing on EOL issues is protecting patients or causing them harm. This dilemma needs to be addressed in open discussion involving all parts of society, in order to improve patient care during the EOL.

Our study has some important limitations. First, we cannot infer any causality between physician characteristics and the variability in EOL care. Second, to limit possible confounders and maximize the influence of physician characteristics, we presented a simplified case scenario, excluding the crucial role that patient, family and surrogates may have in such care. Moreover, our results are restricted to what the physicians said they would do, and do not necessarily reflect what actually happens in practice. Additionally, our study may have been underpowered to detect differences between groups in some of the analyses. The fact that we included physicians from just one large hospital may be seen as a limitation, since results cannot necessarily be generalized to other hospitals or regions. However, this same characteristic ensured a higher response rate than would be possible to achieve in a multicenter study, and as this study was conducted in 11 ICUs from only one hospital, we can exclude any confounding effect of geographical location on the variability of EOL care. In addition to the higher response rate, other strengths of the present study include that the questionnaire was piloted and improved according to expert opinion, and the anonymous nature of the questionnaire, which may have encouraged honest reporting of an issue that is still considered taboo in Brazil, as in many other regions of the world.

Conclusion

This study provides evidence that, in addition to previously reported differences in EOL care, characteristics regarding physician education in EOL care are associated with the variability in EOL management in the ICU. Such findings may contribute to a more refined understanding of the complex process of EOL care in the ICU and increase awareness of the important role that individual physician characteristics may have in variability of EOL care. These findings should encourage further studies to evaluate whether education in EOL care for physicians can modify EOL practice in the ICU.

Conflicts of interest The authors have no conflicts of interest to declare.

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