ORIGINAL ARTICLE

Online education about end-of-life care and the donation process after brain death and circulatory death. Can we influence perception and attitudes in critical care doctors? A prospective study

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SUMMARY

Impact of training on end-of-life care (EOLC) and the deceased donation process in critical care physicians' perceptions and attitudes was analysed. A survey on attitudes and perceptions of deceased donation as part of the EOLC process was delivered to 535 physicians working in critical care before and after completion of a online training programme (2015–17). After training, more participants agreed that nursing staff should be involved in the end-of-life decision process ($P < 0.001$) and that relatives should not be responsible for medical decisions ($P < 0.001$). Postcourse, more participants considered 'withdrawal/withholding' as similar actions ($P < 0.001$); deemed appropriate the use of pre-emptive sedation in all patients undergoing life support treatment adequacy (LSTA; $P < 0.001$); and were favourable to approaching family about donation upon LSTA agreement, as well as admitting them in the intensive care unit ($P < 0.001$) to allow the possibility of donation. Education increased the number of participants prone to initiate measures to preserve the organs for donation before the declaration of death in patients undergoing LSTA ($P < 0.001$). Training increased number of positive terms selected by participants to describe donation after brain and circulatory death. Training programmes may be useful to improve physicians' perception and attitude about including donation as part of the patient's EOLC.

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Key words
attitude, critical care doctors, donation after brain death, donation after circulatory death, end-of-life care, perception

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Introduction

Despite being a frequent practice in the critical care setting, end-of-life care (EOLC) is a common source of controversy among healthcare professionals. This is of special relevance when such decisions may be followed by the possibility of donation.

Several scientific societies recommend that the option of donation should be included as part of EOLC as a way to respect personal autonomy, and for the freedom to manage one's own biography according to personal values [1,2].

Including donation as part of EOLC comprises practices such as the initiation or continuation of intensive care treatment with the aim of incorporating the option of organ donation in patients with no therapeutic possibilities (ICOD) [3], as well as considering donation after circulatory death (DCD) in those following life support treatment adequacy (LSTA).

However, such practices may trigger ethical and moral dilemmas among healthcare professionals mainly caused by a lack of knowledge regarding these procedures, which may lead to misperceptions and create negative attitudes towards such programmes [4].

The aim of the present study was to evaluate whether the implementation of educational programmes about deceased donation and EOLC would clarify misperceptions and promote a positive attitude towards considering donation at the end of life.

Methods

We performed a prospective study including a single group design, before and after a training course. Between 2015 and 2017, a series of online educational courses on EOLC, donation after brain death (DBD) and donation after circulatory death (DCD) were consecutively delivered nationwide to medical doctors who developed their professional activity in critical care settings and were involved in the management of end-of-life care in Spanish hospitals.

The educational intervention

A total of five editions (February–May and October–December 2015/April–June and October–December 2016/October–December 2017) of a three month online course were completed. The course was scientifically endorsed by the Spanish and Catalan Societies of Intensive Care Medicine, as well as the National Spanish Transplant Organization. Enrolment of the participants of the course was voluntary and nationwide, through an online registration page limited to 200 students per edition. Admission of the participants who complied with the criteria (physicians working in hospitals with critical care facilities) was done in a first come, first served bases.

The successful completion of the course, by obtaining more than 7/10 in the final examination, granted medical continuous education credits to the participants.

Course contents consisted of a theoretical section as well as several interactive activities to reinforce the acquired knowledge. Discussion forums were created where several clinical cases were tutored by professionals with extensive clinical experience in the field.

The survey

The ethics committee of the coordinating centre approved the study (14P/2012), developed following national and international standards (Declaration of Helsinki and Tokyo). Data included in the study were kept anonymous, and confidentiality was guaranteed. Participants were asked to fulfil a voluntary survey about their attitudes and perceptions, regarding EOLC and deceased donation (DBD and DCD), before and after the completion of the training. Both questionnaires included a short section with information about the scope of the survey asking for their consent to use their data for research purposes. Upon consent, and after a brief description of participants' demographic data, a set of 22 questions on participants' attitudes (true/false, multiple choice, Likert scale) and perceptions (selecting five terms from a pool of 20 – 10 outlining negative/10 positive qualities), about EOLC and deceased donation, were included.

Internal consistency of the survey rendered a Cronbach's alpha coefficient of 0.735 after eliminating questions with a low item correlation (a minimum reliability threshold of 0.70 was considered as being adequate) [5,6]. Construct validity was assessed by a factorial analysis using the items identified in the reliability analysis. Kaiser–Meyer–Olkin (KMO) index and Bartlett's sphericity test were used to contrast inter-correlations between variables. An orthogonal (Varimax) method was performed to assess factor rotation. The KMO index was 0.630, and Bartlett's test of sphericity was significant ($\chi^2 = 1547.553$, $df = 351$, $P < 0.001$), indicating that the data were suitable for the purpose of factor analysis. Nine factors were identified that explained 59.4% of the variance.

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Statistical analysis

A descriptive analysis of all variables was performed. The responses, before and after the training, were analysed using McNemar test. The association of qualitative variables was carried out using chi-square test. Fisher's exact test was applied to contingency tables when the expected frequency was less than 5. Comparisons for quantitative variables were made with the Student t-test or the Mann–Whitney *U*-test, as appropriate. Odds ratio was calculated when the significance level was reached. Logistic regression models were constructed for every question to analyse their association with age, gender, professional experience (>10/<10 years), professional category (consultant/trainee), specialization (intensive care/anaesthesiology), transplant coordinator functions (yes/no) and working centre type (donor centre/transplant centre/centre with DCD programme) that reached a significant level of $P < 0.2$ in bivariate analyses. The software used to perform the analyses was IBM SPSS v21©.

Results

A total of 920 participants were enrolled in the online training during the study period. Six hundred and sixty-three participants successfully completed the training and answered both surveys. Of these, 535 worked in critical care settings and were selected for the analysis (Fig. 1). The participants were distributed in 145 hospitals representing most regions of Spain, 67.3% were female, 86.4% worked in intensive care units, 13.6% in anaesthesia departments, and 67.1% were trainees. Overall, 34.4% of the participants had more than 10 years of professional experience and 16.4% developed additional tasks as transplant coordinators. Most participants (92.9%) worked in hospitals with active donation programmes in place, 78.7% had DCD programme established (either uncontrolled or controlled DCD), and 53.1% of the hospitals were active transplant centres.

Training helped to modify participants' perception and attitude towards several issues surveyed (Table 1). A set of questions regarding deceased donation as part of EOLC, including ICOD and controlled DCD, were selected for the aim of this study (outlined in Table 1).

End-of-life care

Training increased by 8.4% ($P = 0.004$) the number of participants who considered the registry of living will/advance directives a useful tool for EOLC decision-making (see Table 1).

Before training, only half of the surveyed participants agreed that nursing staff should be included in the end-of-life decision-making process, with notable differences among age, gender and professional categories of those surveyed (Tables 1 and 2). However, in the multivariate analysis the only significant factor related to such opinion was being an ICU specialist ($P = 0.011$). The educational intervention increased by 22.1% the number of participants who agreed that end-of-life decisions should be taken jointly by medical doctors and nurses ($P < 0.001$) eliminating the differences observed among groups.

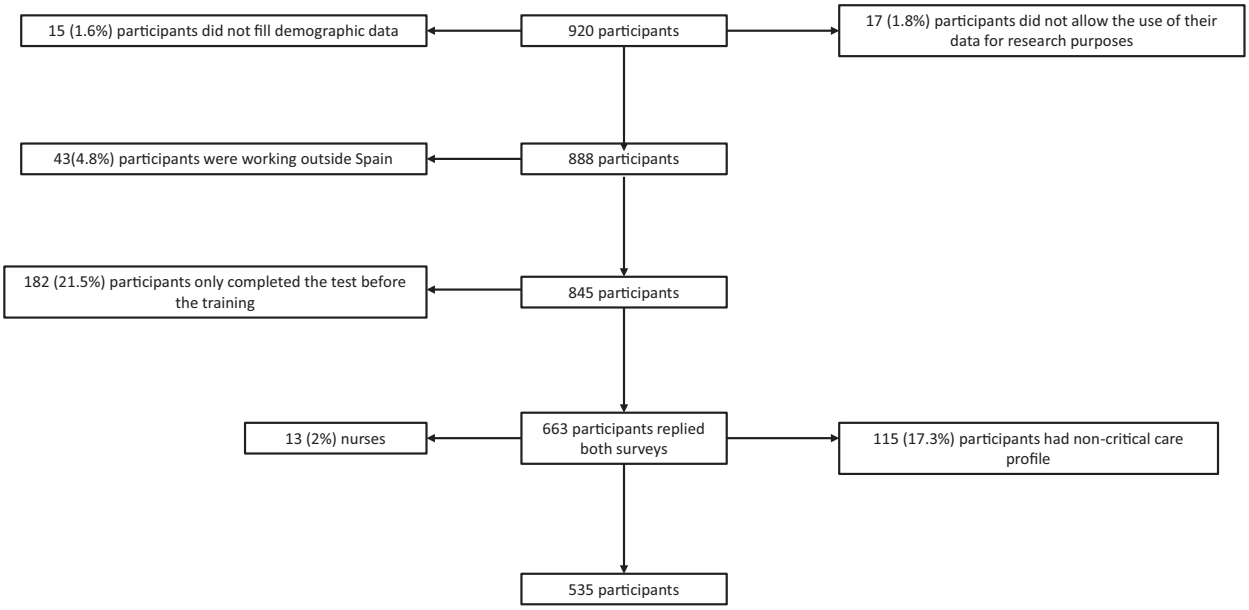

Figure 1 Selection of participants.

Table 1. Results of the survey pre- and post-training.

	Pretraining frequency (%)	Post-training frequency (%)	*P*
In your opinion, is the registry of living wills/ advanced directives useful for end-of-life decision-making?			
Yes	344 (82.3)	373 (89.2)	**0.004**
No/not sure	74 (17.7)	45 (10.8)	
Who should be involved in the LSTA decision-making process?			
The physician in charge of the patient	20 (4)	22 (4.4)	**<0.001**
It should be agreed upon by the complete physicians' team	211 (42.5)	140 (28.2)	
It should be agreed upon by the medical and nursing team	266 (53.5)	325 (67.4)	
Which should be the role of the family in LSTA decision-making process?			
The family should make the decision	175 (32.8)	47 (8.8)	**<0.001**
The family should not be responsible for a medical decision	297 (55.6)	482 (90.3)	
Not sure	62 (11.6)	5 (0.9)	
I do not feel comfortable discussing EOLC with patients and their families			
Yes/usually	150 (28.1)	147 (27.4)	0.862
No/almost never	384 (71.9)	387 (72.6)	
When applying LSTA in your setting			
You follow a protocol about LSTA	142 (26.6)	159 (29.8)	0.460
Each professional applies his/her own criteria	78 (14.6)	81 (15.2)	
There is no protocol, but agreement is reached with the rest of healthcare professionals	271 (50.7)	265 (49.6)	
A protocol exists but it is not fully implemented by healthcare professionals	43 (8.1)	29 (5.4)	
Which of the following statements do you agree with in the context of Life support treatment adequacy?			
Withdrawing and withholding are ethically and legally equal actions	339 (70.9)	420 (87.9)	**<0.001**
Depending on the measures that are withdrawn:	139 (29.1)	58 (12.1)	
Do you agree with the withdrawal of LLST if the following treatments prove futile?			
Inotropes/vasoactive drugs			
Yes	49 (96.1)	48 (94.1)	1.000
No/not sure	2 (3.9)	3 (5.9)	
Mechanical ventilation			
Yes	35 (68.6)	42 (82.4)	0.092
No/not sure	16 (31.4)	9 (17.6)	
Continuos renal replacement therapies			
Yes	50 (98)	48 (94.1)	0.625
No/not sure	1 (2)	3 (5.9)	
Antibiotics			
Yes	39 (74.5)	41 (80.4)	0.581
No/not sure	13 (25.5)	10 (19.6)	
Nutrition/hydration			
Yes	27 (52.9)	29 (56.9)	0.804
No/don't know	24 (47.1)	22 (43.1)	
What do you think about sedation and/or analgesia in those patients in whom LSTA has been decided:			
Regarding indication			
It should only be administered where necessary for the treatment of the patient and his/her families' suffering	151 (28.3)	109 (20.5)	**0.001**
It always must be administered with the aim of anticipating the suffering of the patient and/or the family	382 (71.7)	424 (79.5)	
Regarding the dose			
The necessary dose should be administered to avoid suffering, regardless of the collateral effects	478 (89.5)	489 (91.6)	0.334
High doses should not been administered as they can hasten death	9 (1.7)	4 (0.7)	
Unlimited doses should be used in order to shorten the agony process	47 (8.8)	41 (7.7)	

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Table 1. Continued.

	Pretraining frequency (%)	Post-training frequency (%)	*P*
Do you agree with the following statement? Tissue and organ donation should be part of EOLC.			
Yes	471 (92.2)	500 (97.8)	**<0.001**
No/not sure	40 (7.8)	11 (2.2)	
When is the best moment to approach the family and/or patient to talk about organ and tissue donation?			
At any moment	66 (15.8)	71 (17)	**<0.001**
When the death of the patient is close	172 (41.1)	116 (27.8)	
After the death of the patient	179 (42.8)	230 (55)	
Do you agree with a patient being admitted in ICU with the sole purpose of facilitating organ donation?			
Yes	477 (89.3)	508 (93.1)	**<0.001**
No/not sure	57 (10.7)	26 (4.9)	
Do you think that the management of a potential donor in brain death deserves the same therapeutic effort and use of resources as any other critical care patient?			
Yes	481 (90.1)	497 (93.1)	0.068
No/not sure	53 (9.9)	37 (6.9)	
What is your opinion regarding DCD procedures?			
I am in favour	465 (87.1)	512 (95.9)	**<0.001**
I am against/I am not sure	69 (12.9)	44(4.1)	
Do you agree that once LSTA has been agreed upon, transplant coordinator should approach the family to discuss organ and tissue donation?			
I do not agree/I am not sure	56 (10.5)	9 (1.7)	**<0.001**
I do agree	478 (89.5)	525 (98.3)	
Do you agree on initiating the following measures with the aim to optimize organ preservation before the declaration of death in controlled DCD candidates?			
Pharmacologic measures (e.g. heparin)			
I do agree	493 (92.5)	522 (97.9)	**<0.001**
I do not agree/I am not sure	40 (7.5)	11 (2.1)	
Invasive measures (vessels cannulation)			
I do agree	484 (91.2)	513 (96.6)	**<0.001**
I do not agree/I am not sure	47 (8.9)	18 (3.4)	
I am concerned that the start of uncontrolled DCD programmes may alter the resuscitation measures of those potential candidates who suffer cardiac arrest.			
Completely disagree/disagree	319 (59.7)	385 (72.1)	**<0.001**
Not sure	116 (21.7)	72 (13.5)	
Agree/completely agree	99 (18.5)	77 (14.5)	
I am concerned that the initiation of a DCD programme may influence LSTA decisions			
Completely disagree/disagree	312 (58.4)	388 (72.7)	**<0.001**
Not sure	143 (26.8)	77 (14.4)	
Agree/completely agree	116 (21.7)	69 (12.9)	

Bold value indicates $P < 0.05$ when comparing pre- vs. postcourse.

DCD, donation after circulatory death; DBD, donation after brain death; EOLC, end-of-life care; LSTA, life support treatment adequacy.

In the same line, prior to the course implementation, 55.6% of the surveyed participants agreed with the statement that the family should not be responsible for a medical decision when it comes to EOLC. The multivariate analysis identified being female ($P = 0.009$, OR 1.75, 95% CI: 1.15–2.67), ICU specialist ($P = 0.007$, OR 2.21, 95% CI: 1.25–3.93) and medical consultant ($P = 0.006$, OR 2.17, 95% CI: 1.24–3.75) as independent factors associated with this opinion. Training greatly increased the number of participants agreeing with this position ($P < 0.001$) in all groups analysed except in professional specialization (92.1% intensive care vs. 84.7% anaesthesia, $P = 0.040$).

Prior to the course, 70.9% of participants considered withdrawal and withholding of life support treatment as ethically and legally similar actions in the context of LSTA. The fact of being ICU specialists ($P < 0.001$, OR 5.89, 95% CI: 3.26–10.63) or medical consultant ($P = 0.010$, OR 2.17, 95% CI: 1.20–3.92) was significantly associated with this opinion according to the

Table 2. Results of the univariate analysis of the demographic variables influencing end-of-life care.

	Pretest univariate logistic regression analysis		Post-test univariate logistic regression analysis	
Variables	Odds ratio (95% CI)	*P* value	Odds ratio (95% CI)	*P* value
Who should be involved in the LSTA decision-making process? (It should be agreed upon by the medical and nursing team)				
Mean age (years)	1.03 (1–1.05)	**0.005**	1 (0.98–1.02)	0.943
Gender (male)	1.53 (1.04–2.25)	**0.030**	0.8 (0.53–1.19)	0.267
Working area (ICU)	2.3 (1.31–4.05)	**0.003**	1.6 (0.92–2.77)	0.094
Professional category (consultant)	1.40 (0.96–2.06)	0.080	0.95 (0.63–1.44)	0.813
Years of professional experience (>10 years)	1.31 (0.90–1.92)	0.154	1.21 (0.8–1.83)	0.364
Transplant coordination function (yes)	2.14 (1.28–3.57)	**0.003**	1.12 (0.66–1.9)	0.674
Transplantation programme (no)	1.40 (0.96–2.06)	0.328	1 (0.68–1.5)	0.984
Organ donation programme (yes)	2.14 (1.28–3.57)	1.000	0.46 (0.16–1.4)	0.154
DCD programme (no)	1.09 (0.75–1.57)	0.644	1.04 (0.56–1.9)	0.259
Which should be the role of the family in LSTA decision-making process? (The family should not be responsible for a medical decision)				
Mean age (years)	1.03 (1–1.05)	0.511	1.03 (0.99–1.07)	0.369
Gender (female)	1.66 (1.12–2.54)	**0.011**	1.43 (0.78–2.64)	0.249
Working area (ICU)	2.15 (1.25–3.68)	**0.005**	2.11 (1.02–4.36)	**0.040**
Professional category (consultant)	1.76 (1.19–2.62)	**0.005**	1.08 (0.57–2.03)	0.815
Years of professional experience (<10 years)	1.07 (0.72–1.58)	0.754	0.88 (0.47–1.68)	0.707
Transplant coordination function (yes)	1.43 (0.85–2.41)	0.177	1.72 (0.66–4.49)	0.260
Transplantation programme (no)	1.35 (0.91–1.99)	0.133	0.81 (0.448–1.48)	0.482
Organ donation programme (no)	1.07 (0.72–1.58)	0.091	0.38 (0.14–1.07)	0.071
DCD programme (no)	1.47 (0.99–2.17)	0.054	1.048 (0.56–1.9)	0.915
Which of the following statements do you agree with in the context of life support treatment adequacy (LSTA)? (Withdrawing and withholding are ethically and legally equal actions)				
Mean age (years)	1.05 (1.02–1.07)	**0.001**	0.99 (0.96–1.01)	0.222
Gender (male)	1.27 (0.83–1.95)	0.272	0.72 (0.44–1.2)	0.205
Working area (ICU)	5.97 (3.42–10.41)	**<0.001**	2.6 (1.4–4.7)	**0.001**
Professional category (consultant)	2.24 (1.48–3.39)	**<0.001**	1.69 (1.02–2.8)	**0.039**
Years of professional experience (>10 years)	170 (1.10–2.65)	**0.016**	1.40 (0.81–2.4)	0.236
Transplant coordination function (yes)	2.40 (1.30–4.42)	**0.004**	2.05 (0.91–4.62)	0.079
Transplantation programme (no)	1.43 (0.95–2.17)	0.088	1.23 (0.73–2.1)	0.440
Organ donation programme (no)	4.28 (0.99–18.57)	**0.035**	2.25 (0.36–4.26)	0.726
DCD programme (no)	1.72 (1.13–262)	**0.011**	1.93 (1.12–3.24)	**0.016**

Bold value indicates $P < 0.05$ when comparing pre- vs. postcourse.

multivariate analysis. After the training, an increase of 23.9% was observed in the number of participants who agreed with that opinion ($P < 0.001$), maintaining the same differences in the multivariate analysis among groups.

An increase in the number of participants who agreed on the use of preventative sedation and analgesia in those patients undergoing LSTA was observed after the training ($P = 0.001$) as opposed to those stating that sedation and analgesia should be administered only in cases deemed necessary to manage patient or families' suffering. Regarding the dose to be administered, the vast majority of participants considered this should be administered without limit in order to avoid suffering, regardless of the collateral effects.

Donation as part of end-of-life care

Although already high, training further increased the number of participants across all categories who expressed a favourable opinion regarding the inclusion of donation as part of EOLC ($P < 0.001$; Tables 1 and 3). Moreover, after the training, more participants in all categories were favourable to ICU admission of patients in whom treatment had been deemed futile, with the aim to facilitate organ donation ($P < 0.001$).

Before training, most participants would already agree to bring up the possibility of donation to those patients-families in whom LSTA had been agreed upon. Working as ICU consultant ($P = 0.013$, OR 2.38, 95% CI: 1.20–4.74) or developing functions as transplant coordinator

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Table 3. Results of the univariate analysis of the demographic variables influencing the incorporation of donation as part of end-of-life care.

	Pretest univariate logistic regression analysis		Post-test univariate logistic regression analysis	
Variables	Odds ratio (95% CI)	*P* value	Odds ratio (95% CI)	*P* value
Do you agree that once LSTA has been agreed upon, transplant coordinator should approach the family to discuss organ and tissue donation? (agree)				
Mean age (years)	1.03 (0.99–1.06)	0.099	1.99 (0.92–1.01)	0.908
Gender (male)	1.24 (0.68–2.29)	0.485	1.66 (0.44–6.25)	0.452
Working area (ICU)	2.37 (1.22–4.61)	**0.009**	0.79 (0.01–6.38)	1.000
Professional category (trainee)	1.25 (0.68–2.31)	0.467	3.97 (0.49–3.2)	0.283
Years of professional experience (>10 years)	2.31 (1.17–4.59)	**0.014**	1.05 (0.26–4.23)	1.000
Transplant coordination function (yes)	5.91 (1.41–24.7)	**0.006**	0.83 (0.8–0.87)	0.368
Transplantation programme (yes)	1.26 (0.72–2.20)	0.423	0.82 (0.2–3.31)	1.000
Organ donation programme (yes)	2.14 (0.77–5.91)	0.135	2.5 (0.3–20.8)	0.364
DCD programme (yes)	1.47 (0.80–2.56)	0.175	0.76 (0.2–3.01)	1.000
What is your opinion regarding DCD procedures? (I am in favour)				
Mean age (years)	1.02 (0.99–1.05)	0.312	0.99 (0.92–1.08)	0.908
Gender (male)	2.07 (1.12–3.84)	**0.018**	1.31 (1.51–3.42)	0.575
Working area (ICU)	3.18 (1.76–5.76)	**<0.001**	1 (0.29–3.48)	1.000
Professional category (trainee)	1.58 (0.88–2.83)	0.118	1.31 (0.51–3.42)	0.575
Years of professional experience (<10 years)	1.8 (0.70–1.99)	0.538	0.88 (0.35–2.21)	0.790
Transplant coordination function (yes)	1.58 (0.73–3.43)	0.244	0.83 (0.8–0.86)	**0.035**
Transplantation programme (yes)	1.30 (0.78–2.17)	0.310	0.6 (0.23–1.57)	0.297
Organ donation programme (yes)	1.65 (0.60–4.55)	0.323	0.95 (0.93–0.97)	0.617
DCD programme (yes)	2.04 (1.22–3.40)	**0.006**	1.28 (0.54–3.02)	0.573
Do you agree on initiating pharmacological measures with the aim to optimize organ preservation before the declaration of death in controlled DCD candidates? (agree)				
Mean age (years)	1.00 (0.97–1.04)	0.898	1.04 (0.98–1.09)	0.195
Gender (female)	1.41 (0.73–2.73)	0.307	1.18 (0.34–4.1)	0.775
Working area (ICU)	1.38 (0.59–3.25)	0.460	0.63 (0.8–5)	1.000
Professional category (consultant)	1.11 (1.56–2.18)	0.769	1.73 (0.52–5.73)	0.335
Years of professional experience (>10 years)	1.09 (0.55–2.18)	0.793	0.63 (0.2–2.08)	0.525
Transplant coordination function (yes)	1.41 (0.54–3.71)	0.484	0.89 (0.2–4.2)	0.701
Transplantation programme (yes)	1.9 (0.99–3.63)	**0.049**	0.36 (0.08–1.67)	0.220
Organ donation programme (yes)	3.22 (1.15–9.07)	**0.019**	1.99 (0.25–16.15)	0.426
DCD programme (yes)	1.47 (0.99–2.17)	0.054	1.27 (0.38–4.21)	0.760

Bold value indicates $P < 0.05$ when comparing pre- vs. postcourse.

($P = 0.031$, OR 5.01, 95% CI: 1.15–21.68) were identified as independent factors associated with this opinion in the multivariate analysis. Training was followed by an increase in the number of participants who agreed with this opinion across the different groups analysed with no differences in the multivariate analysis.

Although the great majority of the participants (87.1%) had a favourable opinion towards DCD before training, only males ($P = 0.043$, OR 1.93, 95% CI: 1.02–3.67), those working as ICU consultants ($P < 0.001$, OR 3.84, 95% CI: 2.03–7.25) or in hospitals with DCD programmes in place ($P = 0.003$, OR 2.30, 95% CI: 1.33–3.96) were significantly associated with a favourable opinion in the multivariate analysis. Training further increased, by 10.1% ($P < 0.001$) the number of participants who were in favour of this practice across all categories analysed.

Similarly, training further increased by 5.8% ($P < 0.001$) the number of participants who previously strongly agreed to the initiation of pharmacological (e.g. heparin) or invasive (e.g. cannulation) measures with the aim to optimize the preservation of organs before the declaration of death in those patients undergoing EOLC.

In the case of pharmacological measures, the multivariate analysis only identified working in a hospital with DCD programme ($P = 0.030$, OR 2.10, 95% CI: 1.07–4.11) to be significantly associated with this option. However, after the training all differences among categories disappeared.

Training helped to clarify some of the participants' ethical concerns about DCD, such as the independence of LSTA decision from the controlled DCD process, as noted by a 24.5% increase in the number of participants subscribing to this statement after completing the syllabus ($P < 0.001$). Multivariate analysis of the pretraining survey identified the fact of being a medical consultant ($P = 0.007$, OR 2, 95% CI: 1.21–3.35) and/or developing transplant coordination functions ($P = 0.006$, OR 2.15, 95% CI: 1.25–3.71), as significantly associated with this opinion.

Finally, training improved the overall perception of DBD and DCD as reflected by an increase in the number of positive terms selected by participants to describe such programmes (4.71 ± 0.61 vs. 4.83 ± 0.52, $P < 0.001$) and (3.44 ± 1.45 vs. 3.76 ± 1.32, $P < 0.001$), respectively (Fig. 2).

Discussion

The present work represents one of the largest multicentre studies (145 centres) exploring the impact of training on critical care doctors' attitudes and perception related to donation as part of EOLC. Several authors have reported the attitudes or perceptions towards EOLC or deceased donation in healthcare professionals of a given area or country [7–9]. The impact of training on the attitudes and perceptions regarding different issues related to donation has previously been evaluated by some authors. However, the limited number of centres and participants included, the different profile of the surveyed population (students, nurses, or patients) and the diverse methodology used in such studies may not make results comparable to the present survey [10–12].

Some of the barriers hindering an adequate EOLC provision are related to the medical professionals themselves, mostly due to their lack of knowledge or legal/ethical concerns [4]. A survey conducted among 541 German intensive care anaesthesiologists identified lack of training as the main barrier to implementing EOLC in Germany [13]. This concern has been raised recently by other authors reporting that not even 50% of a large cohort of Italian and American critical care professionals surveyed confirmed that they had training in EOLC [8,14]. However, education in EOLC is not easy to implement, as to date a common international consensus does not exist regarding EOLC training methodology nor the measurement of its efficacy [15–17].

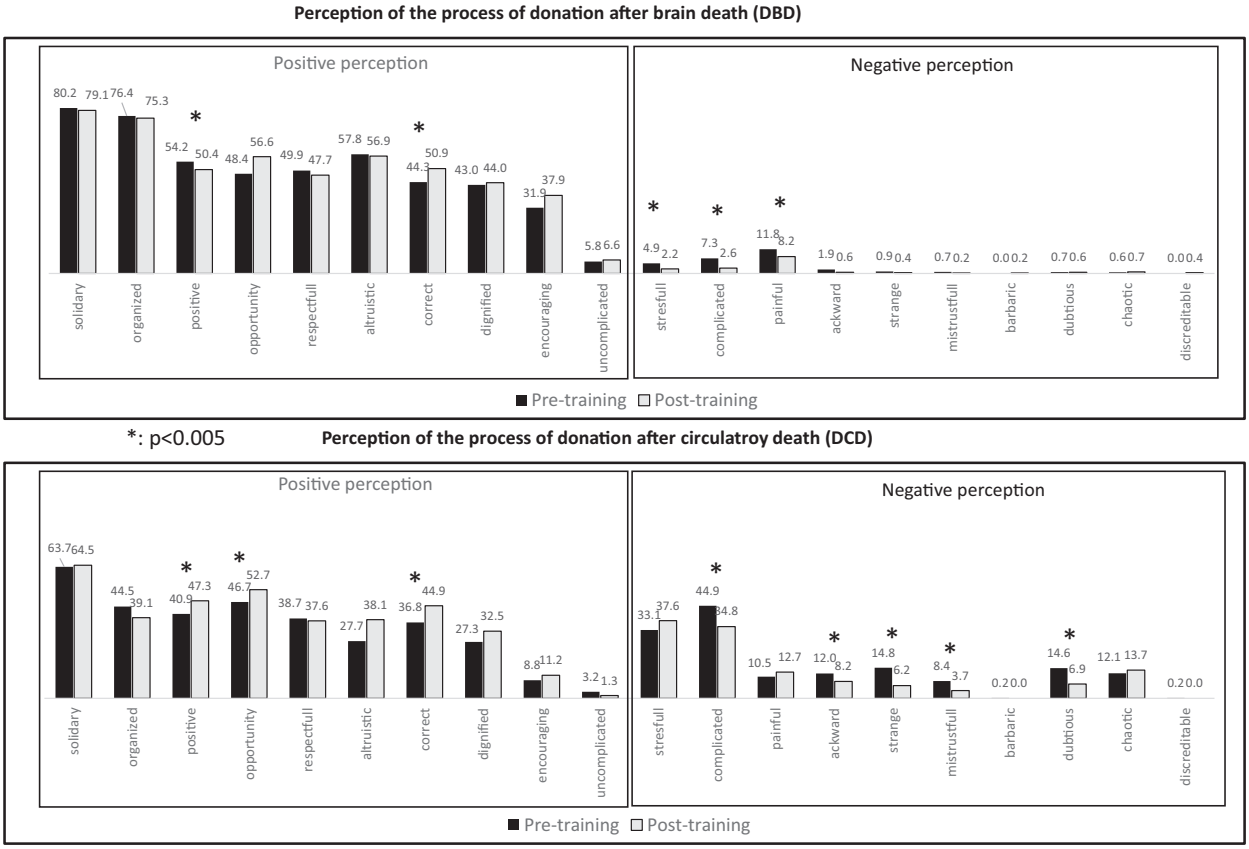

Figure 2 Perception of DBD and DCD processes. *$P < 0.005$.

Flannery *et al.* [18] reported a lack of consensus among healthcare professionals on defining the number and qualification of professionals taking part in the EOLC decision process. The author finally stated that the participation of registered nurses in such procedures relies ultimately on the decision of the medical doctor. In the present study, half of the participants initially agreed to include nurses in the end-of-life decision process. However, as reported in other publications [8], training increased the perception that multidisciplinary interventions facilitate the adequate provision of EOLC in ICU settings [1,19].

Training increased the number of participants that believed that family should not bear the responsibility of a medical decision when it comes to EOLC. Communication with the family in end-of-life situations is normally performed in a setting of distress, where complex treatments are provided, and where holistic communication is not always possible for a variety of reasons [20]. In recent years, significant effort has been made to set up strategies that facilitate patient and family participation in end-of-life decisions creating models that range from a model of informed consent to shared decision-making [21]. The family must be informed and consulted without making them responsible for decisions. However, decisions should be weighed considering the opinion of the competent patient through their advanced directives, or via their family.

Training increased the opinion of participants regarding the pre-emptive provision of analgesia and sedation to all patients undergoing LSTA. Although guidelines on sedation practices in palliative care have been widely published [22–24], there is still an ongoing debate on the moment and intention of such provision. Some authors advocate that when death is inevitable and imminent suffering is anticipated, concerns about respiratory depression should be dismissed, and vigorous pre-emptive deep sedation or anaesthesia provided. On the other hand, other authors recommend providing sedation and analgesia in a reactive way to the presence of suffering of the patient.

The scarcity of organs demands exploration of new ways of increasing the donor pool [25,26]. In this regard, most international medical organizations together with professional associations are making great efforts in ensuring that organ donation be included as part of the EOLC [27,28]. Intensive care orientated to donation (ICOD) and initiation of donation after circulatory death programmes are two good examples of such practices.

The ACCORD study reported that almost 40% of patients dying after a catastrophic brain injury in 68 Spanish hospitals during 2014–15 were never admitted to the ICU, and 36% of them were never reported to the transplant coordinator [29]. In order to meet the organ demand for transplantation, it has become necessary to consider the potential capacity for donation of this type of patients who may be eligible for ICOD. This procedure comprises a set of measures that while guaranteeing the comfort and dignity of the patient with catastrophic brain damage in the process of death, allow their natural progression to brain death and ensure the adequate preservation of potentially transplantable organs. The ethical justification of ICOD practices is framed in respect for the dignity and personal autonomy of those in the process of dying, and allows them to choose to donate their organs, and to manage their own biography according to their values [1,30]. In the present work, nearly 90% of the participants agreed with ICOD procedures proving that donation is slowly being included as part of EOLC [31–33].

Donation after circulatory death has been a regular practice for decades in some countries such as North America, Australia, United Kingdom, Belgium or the Netherlands, having recently being introduced in Spain [34] and France. This type of donation can raise several ethical dilemmas among healthcare professionals, some related to the connection between EOLC and the donation process itself and others related to procedures necessary to its implementation, such as *premortem* cannulation or medicating a living patient with the purpose of optimizing donation. Prior to the educational intervention, the percentage of participants supporting DCD was high, especially in those working in settings familiar with this procedure (see Table 2). However, training increased the acceptance of this procedure in all groups regardless of their previous experience with DCD. Several authors have reported how education may help to clarify ethical and technical concerns related to DCD protocols [35–37]. They concluded that training in DCD is necessary [38], and beneficial for all healthcare professionals independently of their degree of involvement in such procedures [17,39].

The use of different terms to define a procedure has been observed in several qualitative studies in the field of organ donation such as Squires *et al.* that reported that 75% of 55 Canadian critical care professionals defined DCD process as being complex and challenging [38]. Although not a qualitative study, we observed how training helped improve the positive perception of both DBD and DCD as reflected by an increased number of positive terms selected by participants to describe such procedures postcourse (Fig. 2).

Limitations

Despite the large number of participants surveyed, results reported in the present work may not represent the attitudes and perceptions of all healthcare professionals working in critical settings in Spain, but only those in favour of such proceedings who were more likely to enrol voluntarily in this course. Likewise, the pretest may have sensitized participants to what is being investigated and thereby affected post-test results.

It should also be noted that, during the study period, there was an exponential increase of hospitals implementing DCD programmes in Spain that could have influenced the attitude of the participants affecting the nature of their responses.

Lastly, education using the 'colder' online format may have hindered tutor/student personal interaction, particulary important when dealing with such a sensitive issue. However, several studies reveal e-learning as effective as face-to-face training making it possible to reach a larger number of healthcare professionals who frequently experience problems related to time, cost and mobility [40–42].

Conclusions

Training in end-of-life care and the donation process may help to eliminate healthcare professionals' misperceptions around issues impacting on the development of donation programmes. This is all the more important in the present scenario where donation programmes have been severely affected by the COVID-19 pandemic.

E-learning format may be a useful tool to effectively deliver education to healthcare professionals allowing them to obtain high tailor-made quality training paced to their own agendas.

Authorship

AS, ML and JSI: contributed to the study conception and design. MLS, JD and XM: performed material preparation and data collection. JSI and TSP: performed data analysis. The first draft of the manuscript was written by AS, ML and JSI under the supervision of BD and TP. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Conflict of interest

The authors declare that they have no competing interests.

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Ethics approval

The ethics committee of the University Hospital Joan XXIII in Tarragona, Spain, approved the study (ethical approval no.: 14P/2012). It was developed following national and international standards (Declaration of Helsinki and Tokyo). The data included in the study were kept anonymous, and confidentiality was guaranteed. Participants received no financial compensation for their participation.

Consent to participate and consent for publication

Informed consent was obtained from all individual participants included in the study. The first question of the survey asked for the consent of the participants to use their survey results and its potential publication in a journal.

Data availability statement

The data sets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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