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ORIGINAL ARTICLE

ETPOD (European Training Program on Organ Donation): a successful training program to improve organ donation

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Summary

Advanced training of healthcare professionals active in organ donation is highlighted as a major means to overcome organ shortage. The objective of this study was to improve donation rates in the selected European target areas (TAs) by providing an advanced training program. A prospective intervention study was conducted in 25 TAs with active donor programs from 17 European countries, between 2007 and 2009. A training program based on collaborative methodology was designed at three different professional levels (health workers awareness, junior transplant coordinators, managers). Courses evaluation scores and donation figures in each TA were collected and compared before and after intervention. Courses with new developed training tools were implemented reaching out 3286 healthcare professionals. Feed-back questionnaires revealed a high degree of satisfaction among participants (average of 4.35 on a 1–5 scale). The number of utilized donors in the TAs increased from 15.7 ± 14.3 (95% CI: 9.8–21.6) to 20.0 ± 17.1 (95% CI: 13–27.1) ($P = 0.014$) and the number of organs recovered increased from 49.7 ± 48.5 (95% CI: 29.6–69.7) to 59.3 ± 52.1 (95% CI: 37.8–80.8) ($P = 0.044$). The European Training Program on Organ Donation is a successful training program, achieving a significant increase in organ donation figures.

Introduction

Organ shortage [1–3] is the major limiting factor for the further development of transplant programs worldwide. Participants to the third WHO Global Consultation on Organ Donation and Transplantation [4] 'urged the WHO, its Member States and professionals in the field to regard organ donation and transplantation as part of every nation's responsibility to meet the health needs of its population in a comprehensive manner and address the conditions leading to transplantation from prevention to treatment'. The goal is to achieve self-sufficiency in organ donation and transplantation. Far from that, about 60 000 European citizens are currently waiting for an organ transplant [5]. Moreover, a large variability between the different European member states in the availability of transplantable organs is seen (1.6 donors per million in habitants in Bulgaria to 34.4 in Spain in 2009) [6]. Several possible factors have been analyzed, such as differences in legislation, management, and organization of deceased organ recovery programs as well as education of professionals active in this field, urging European initiatives [7] to be taken to standardize best common practices in every European member state [8] to optimize the overall European donor potential. Although multifactor approaches are needed to tackle the issue on different levels, besides social awareness [9], mass media campaigns [10], religion [11], ethics [12] and legislative modifications [13], the advanced

training of professionals active in organ donation [14,15], and their involvement in the implementation of proactive donor detection systems at hospital level [16] is highlighted as the major factor by many national and international programs. The recently published *critical pathway for deceased donation* [17] will contribute to establish a universal terminology and a common systematic approach to the donation process.

There are different standard approaches addressed to promote changes in practice performance. Continuous medical education meetings have demonstrated a very low impact on health care outcomes [18,19]. A recently developed method known as quality improvement collaborative brings together groups of healthcare delivery organizations, facilitates their collaboration and emphasizes learning, insight and support exchange, to enforce effect evidence-based practices with the aim of reducing the unjustified variability in clinical practices, treatment delivery and health outcomes [20,21].

The analysis of best practices shows that the presence of a trained donor coordinator within every hospital [22] is one of the major key factors to maximize deceased donor potential and eventually increase donation rates. Among other initiatives undertaken by the European Commission, the Health and Consumer Protection Directorate General has worked toward the European Training Program on Organ Donation (ETPOD) project (DGSANCO–EAHC 2005205) to develop ETPOD and analyze whether a comprehensive educational project in transplant coordination could improve the donation rates in Europe [23]. Through its 'Action Plan on Organ Donation and Transplantation (2009–2015)', the European Commission supports the implementation of effective training programs for transplant donor coordinators [24,25]. The ETPOD project was designed to produce and implement educational standards and methodology in organ donation to raise awareness among professionals active in the field. For this purpose, TPM (Transplant Procurement Management) [26] along with the IL3 (Institute for Lifelong Learning), University of Barcelona (UB), was identified to coordinate and develop, together with project partners, the different educational programs for ETPOD. Different educational methodologies and practices were used to ensure high quality training standards. As shown by other national initiatives, such as the Organ Donation Breakthrough Collaborative, the presence of 'learning sessions' attended by hospital and Organ Recovery Organization staff as well as the dissemination of 'best practice standards' lead to a significant increase in effective deceased donor numbers [27]. The ETPOD project aimed to prove by means of a common standardized international education platform that it could positively impact donor detection and utilized donor numbers, despite the wide variety of legislations, health care standards, policies, and practices in the different European member states. ETPOD objective was to design and implement an effective three-level training methodology and prove its effectiveness by improving organ donation rates in 25 target areas (TAs) in Europe.

Study design, materials and methods

ETPOD partners were selected according to their organizational model and actual donor rates per million inhabitants, ranging from the lowest to the highest numbers among European averages. The ETPOD project finally identified 17 partner countries, 20 partner organizations from State agencies to universities, and 25 TAs within Europe and Turkey.

First, a steering committee was created, involving representatives from the 20 partner organizations, fully responsible to carry out the ETPOD project strategic resolutions. Chaired by the project director, it managed the overall project strategy, work program, financial management, and communication flow. The project methodology responded to the cycle of: analysis of the country's current situation, design of training programs adapted to its needs, programs' validation and implementation, follow-up, assessment, and, finally, analysis of its transferability observing again the country's current situation. The strategy was followed with the awareness that each participant country has different donation rates per million inhabitants (pmp) [28] and different organizational models [29]. The learning methodology used to implement the ETPOD project consisted of e-learning and face-to-face training (blended learning system).

The steering committee identified three different educational levels: (i) Essentials in Organ Donation; (ii) Professional training for Junior Transplant Coordinators and 3. Organ Donation Quality Management. To design and implement the different educational initiatives, the committee decided to divide the representatives of 17 countries and 20 partner organization included in the project into four working groups.

Working group 1 was responsible to analyze the European reality on organ donation within two areas:

1. Training needs. A study was conducted among healthcare professionals involved in organ donation, assessing the topics of main interest to be considered in the new course.
2. Donation rates. A comparative analysis was performed, comparing organ donation rates before and after the implementation of the training programs in the 25 different TAs in accordance with their organizational structure and resources available.

Working group 2 developed the 'Essentials in Organ Donation' (EOD) seminars along with the 'Training for Trainers' program and endorsed its implementation in the

different TAs. EODs are 8-academic-hour seminars that aim at providing participants with the basic knowledge related to the organ donation process, promoting a positive attitude toward it [30] and empowering the detection of potential donors. It addressed healthcare professionals who may be involved in any phase of the organ recovery and transplant process, particularly those who work in areas where organ donors can be actively detected, such as intensive care units, postoperative recovery and emergency rooms, etc. The 'Training for Trainers' program was developed alongside to prepare experienced organ donor coordinators as multipliers of EOD seminars. Tutors and participants developed the training materials required for the EOD seminars. They were afterward adapted to the local legislation and current medical practices, and translated into 14 languages.

Working group 3 was responsible to train healthcare professionals in charge of managing the donation process, those owing to join a Transplant Coordination Office, and key donation professionals wishing to update their knowledge and reinforce their competences. With this regard, it developed the 'Professional Training on Organ Donation' program, which considered both on-line and face-to-face training. The course included all the aspects of the organ recovery process and organization in five on-line modules consisting mainly in theoretical knowledge: 'Donor Detection Systems'; 'Brain Death Diagnosis'; 'Donor Management & Organ Viability'; 'Family Approach for Organ Donation', and 'Organ Recovery Organization, Preservation and Allocation Criteria'. The face-to-face course that followed was mainly practical, with simulations that emulated the whole donation process.

Working group 4 developed the 'Organ Donation Quality Management' course. This training program was designed to provide managers of national, regional, and local organ recovery organizations with the skills required to efficiently organize, manage, and evaluate a transplant area to increase organ donation in the TAs as well as to promote the implementation and assessment of quality and safety measures.

Along with the implementation of the different educational training programs, objective data were monitored.

Three meetings were held during the ETPOD Project development, following a similar schedule structure. Their objectives were as follows:

First Working meeting: to introduce the Coordinator and partners organizations as well as the project objectives and activities to be developed; to define the Working Groups structure, objectives, and deadlines during the first year of the Project; to clarify the budget management and administrative control systems.

Intermediate Working meeting: to review the results obtained during the first year; to determine the Working Groups objectives and deadlines for the second year; to schedule and organize all the training programs developed.

Final meeting: to review all the activities developed during the project; to discuss the results obtained after evaluating the training programs implemented; to approve the draft of the Project Final Report.

Three communication tools were developed for the project and made available through the project website http: www.etpod.eu:

1. *The public website* aimed at providing TAs, health professionals trained within the project and the general public with information about the project and its results.
2. *The private virtual platform* aimed at keeping the project partners informed about the project development, facilitating the implementation of training programs, communication among partners, and their access to a specialized database, as well as enabling them to share working files and comments in the discussion forum.
3. *The e-learning campus* aimed at offering on-line training programs developed within the project. To get familiar with the learning environment, UB Virtual provided course participants with a preliminary training on how to handle the virtual environment called 'Learning On-Line'.

Twenty-five TAs from 16 countries were geographically defined by the consortium partners as following: Austria (AU1), Bulgaria (BU1), Cyprus (CY1), Estonia (EE1), Germany (DE1, DE2, DE3), Greece (GR1, GR2), Italy (IT1, IT2), Lithuania (LT1), Poland (PL1, PL2, PL3), Portugal (PT1), Romania (RO1, RO2), Slovak Republic (SK1),

Figure 1 Twenty-five Target areas from 16 countries (Austria, Bulgaria, Cyprus, Estonia, Germany, Greece, Italy, Lithuania, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and Turkey) were geographically defined by the consortium partners.

Slovenia (SL1), Spain (ES1, ES2), Sweden (SE1), and Turkey (TR1, TR2) (Fig. 1). TAs were selected according to the following criteria: to have at least one donor hospital and a population over 500.000 inhabitants. They were not necessarily representative for their countries, were of different sizes, with a diverse structure, and unequal investment in health [31]. France was also part of the project, but without identifying any TA, as it was implementing a new training system at the time and did not want any interference with the ETPOD training.

Study participants were recruited according to their professional profile and the requirements of each training level.

Two different survey (S) identification points were established as following: January–June 2007 (survey no. 1: S1) and January–June 2009 (survey no.2: S2), namely before and after implementing the whole educational program. In a prospective descriptive study design, data were collected per TAs, including total number of population, total number of hospitals, total number of hospital beds, total number of ICU beds, total number of neurosurgery departments, total number of admitted patients in ICU, total number of ICU deaths, total number of declared brain deaths in ICU, total numbers of refusals, total number of utilized donors, total number of organs recovered, and total number of donor coordination staff (fulltime or part time).

To assess the impact of the training program, the 2007 related data (S1) were compared with the data for 2009 (S2). To analyze the changes occurred, understand the relation among the different factors and the mutual influence, two main groups of variables were considered, such as those related to organization (existence of training activity in TAs and the number of donor coordinators employed part time or full time) and donation process (total number of diagnosed brain deaths, total number of refusals, total number of utilized donors, and total number of organs recovered).

Statistical analysis

Univariate statistical analysis using Fisher-exact and Student *t*-paired tests was used to compare data. A Spearman test was used to analyze the correlation between factors. *P*-value equal to or smaller than 0.05 (5%) was seen as statistically significant. All statistical tests were performed using the SPSS® software version 15 (SPSS Inc., Chicago, IL, USA).

Results

Data from 220 hospitals in 25 TAs were analyzed by working group 1. Table 1a–d summarize the different descriptive data collected at the beginning and at the end of the project. TAs were of different sizes, with a population ranging from 500.000 to 4.000.000 inhabitants. The number of hospitals per TA varied considerably. While in 18 TAs, the number of hospitals varied between 2 and 5, there were TAs as Italy (IT1) and Austria (AU1) with a very high number of hospitals, 76 and 68, respectively. These figures include a high number of hospitals with no donation potentiality. The number of ICU beds also differed between TAs. The number of brain deaths reported in the ICU ranged from 76 in Italy (IT1) to 0 in Romania (RO2). (Table 1a,b)

The highest number of refusals, 52, was registered in Austria (AU1). However, the highest number of utilized donors and recovered organs was registered in the same TA (AU1) (69 and 228, respectively). Sweden (SE1) reported the highest number of donation coordinators (Table 1c,d).

Comparing the data collected before and after the implementation of the educational program, there were no differences in TA population, number of hospital beds, number of ICU beds, neurosurgical units or professionals devoted to donation, and TA deaths (Table 1a–d). Although the number of brain death cases diagnosed increased, the difference was not statistically significant.

The number of utilized donors identified increased from 15.7 ± 14.3 (95% CI: 9.8–21.6) in January–June 2007 (survey S1) to 20.0 ± 17.1 (95% CI: 13–27.1) in January–June 2009 (survey S2) ($P = 0.014$) and the number of organs recovered increased from 49.7 ± 48.5 (95% CI: 29.6–69.7) in S1 to 59.3 ± 52.1 (95% CI: 37.8–80.8) in S2 ($P = 0.044$). In 16 (64%) TAs, the number of utilized donors detected increased, in two remained unchanged and it decreased in seven. The number of organs recovered increased in 19 (76%) TAs, remained unchanged in one and decreased in five. No relationship could be found between the profile of the TAs and their results.

The results of working group 2 are summarized in Table 2. Sixty EOD seminars were carried out and a total of 3163 participants were trained. Seminar assessments were answered by 1332 participants. The results concerning lectures evaluation, total number of questions answered in the EOD tests, participants' professional background and their level of involvement in the donation – transplantation process, as well as changes in their attitude toward donation after attending the seminar are all shown in Tables 2 and 3. We could not find any correlation between the number of participants in the EOD seminars and the changes reported in brain death diagnoses, number of utilized donors, and number of organs recovered (Table 1c,d).

The number of experienced organ donor coordinators as multipliers of EOD seminars who attended the face-to-face and the online 'Training for Trainers' courses are shown in Table 4. From a total number of 51 participants who took part in the online course, 43 attended the face-to-face training and 37 got certified, representing 72.6% of the total number of participants. The course evaluation results are also summarized in Table 4. The overall assessment shows

Table 1. (a) General and ICU information descriptive data collected for every target area (TA) at the beginning (Survey 1: year 2007) and the end (Survey 2: year 2009) of the project. Blanks were left where information was not provided. (b) Summary of general and ICU information descriptive data collected at the beginning (Survey 1: year 2007) and the end (Survey 2: year 2009). (Data expressed as mean ± standard deviation (range); statistical analysis: paired *t*-test). (c) Donation and coordination descriptive data collected for every TA at the beginning (Survey 1: year 2007) and the end (Survey 2: year 2009) of the project. Blanks were left where information was not provided. (d) Summary donation and coordination descriptive data collected at the beginning (Survey 1: year 2007) and the end (Survey 2: year 2009) of the project. (Data expressed as mean ± standard deviation (range); statistical analysis: paired *t*-test).

(a)

		General information						ICU		
Country	TA ID	Population (thousands) S1/S2	Hospitals	Total beds S1/S2	Total deaths S1/S2	ICU beds S1/S2	Neuro-surgery Facility Units S1/S2	Patients admitted in ICU/year S1/S2	ICU Deaths/ year S1/S2	Declared brain deaths in ICU/year S1/S2
Austria	AU1	3.523/3.600	68	22 179/22 250	34 000/36 500	413/420	5	–	4420/4520	69/74
Bulgaria	BG1	500/480	2	1500/1950	1197/1474	26	2/1	959/1117	419/247	14/10
Cyprus	CY1	700	5	1013	–	64	–	–	180/-	5/8
Estonia	EE1	1.342	3	2486/2369	2231/2205	117/97	2/1	8683/6428	655/486	26/40
Germany	DE1	1.000	2	2460	1489/1586	249	2	14 195/12 421	770/1017	33/21
Germany	DE2	626	2	2600/2580	1088/1683	211	2	14 502/12 282	1000/1056	20/35
Germany	DE3	350	4	–/4047	–/3421	268	4	9980/9978	424/412	55/57
Greece	GR1	800	2	1606	2815/2345	72	2	825/693	271/201	18/9
Greece	GR2	1000	2	1750	1650/990	75/80	2	1286/893	355/198	30/20
Italy	IT1	4000	76	16773	8222	184/192	9	6436/6318	1765/1835	76/361
Italy	IT2	250	2	500/724	100/695	22/23	2	576/703	18/246	30/22
Lithuania	LT1	1909/1899	4	3744/3914	2967/2713	125/155	4	23 210/21 235	1677/1701	70/89
Poland	PL1	500	2	1449/1264	1374/-	21/22	2	668/698	316/327	12/4
Poland	PL2	900	2	1374/1371	1401/1540	20/17	3	358/414	137	15/8
Poland	PL3	364	2	1779/1731	1322/1336	23	2	801/762	242/226	16/30
Portugal	PT1	950	3	907	1391/-	73/75	1	751/1865	341/231	
Romania	RO1	900	3	3439/3461	2631/2517	65/67	1	5817/6013	1571/1664	33/36
Romania	RO2	250	1	1500/1300	1000/893	24	1	1983/2104	190/237	0/4
Slovak Rep.	SK1	865	9	4734	–	49/52	12/14	–	–	13/26
Slovenija	SL1	810	3	2920/2855	2833/-	88/95	1	7778/-	554/-	46/33
Spain	ES1	300	1	425/400	816/921	18	1	477/488	106/108	10/17
Spain	ES2	100	1	626	1016/-	22	1	–	220/161	45/41
Sweden	SE1	1600	14	4041	6891/6900	87	1	6390/6857	693/624	32/33
Turkey	TR1	1700	4	2044/2215	1955/2112	74/92	3	1031/2394	600/642	43/48
Turkey	TR2	3500/3356	3	4101/3855	2760/2804	384/170	3	1378/3707	682/1010	73/75

(b)

	2007	2009	*P*
Population (thousands)	1149.6 ± 1059.6 (100–4000)	1145.7 ± 1054.2 (100–4000)	0.567
Hospitals	8.8 ± 19.3 (1–76)		
Total beds	3581.3 ± 5101.1 (425–22 179)	3607.8 ± 5000.7 (400–22 250)	0.779
Total deaths	3688.6 ± 7029.4 (100–34 000)	4255.6 ± 8049.3 (695–36 500)	0.314

Table 1. continued

(b)

	2007	2009	*P*
ICU beds	111.0 ± 112.4 (18–413)	104.8 ± 99.3 (17–420)	0.495
Neuro-surgery Facility Units	2.5 ± 1.9 (1–14)		
Patients admitted to ICU	5380.4 ± 6221.3 (358–23 210)	4868.5 ± 5514.8 (414–21 235)	0.578
ICU Deaths	733.6 ± 923.8 (18–4420)	785,7 ± 994.7 (108–4520)	0.503
Declared brain deaths in ICU	32.7 ± 22.5 (0–76)	45.9 ± 71.0 (4–361)	0.281

(c)

	Donation and coordination											
		Refusals		Utilized donors			Organs recovered			Total donation coordinators		Part time
Country	TA ID	2007	2009	2007	2009	%	2007	2009	%	2007/2009 S1/S2	Full time 2007/2009 S1/S2	2007/2009 S1/S2
Austria	AU1	52	58	69	78	13.0	228	247	8.3	9	2	7
Bulgaria	BG1	6	3	8	5	−37.5	15	16	6.7	4/3	0	4/3
Cyprus	CY1	–	–	5	8	60.0	13	21	61.5	3/5	3/4	0/1
Estonia	EE1	5	7	10	33	230.0	19	85	347.4	4/6	2/1	2/5
Germany	DE1	3	7	20	16	−20.0	65	52	−20.0	5	5	0
Germany	DE2	6	12	7	23	228.6	24	74	208.3	2/4	2	0/2
Germany	DE3	20	20	23	18	−21.7	84	92	9.5	5/6	3/2	2/4
Greece	GR1	12	1	7	7	0.0	15	20	33.3	2	0	2
Greece	GR2	–	7	8	12	50.0	24	29	20.8	3	3	0
Italy	IT1	29	36	27	44	63.0	91	126	38.5	25/27	23/27	2/0
Italy	IT2	6	11	12	9	−25.0	40	34	−15.0	15/2	0	15/2
Lithuania	LT1	35	24	33	50	51.5	104	105	1.0	5/9	2	3/7
Poland	PL1	–	1	7	1	−85.0	22	2	−90.9	5	0	5
Poland	PL2	0	3	2	4	100.0	4	12	200.0	0	0	0
Poland	PL3	3	11	13	19	46.2	38	46	21.1	4/2	0/1	4/1
Portugal	PT1	–	–	6	13	116.7	16	33	106.3	2/3	0	2/3
Romania	RO1	13	15	4	14	250.0	15	27	80.0	1	0	1
Romania	RO2	–	2	0	2	–*	0	4	–*	1	1	0
Slovak Rep.	SK1	–	–	13	26	100.0	34	81	138.2	12/11	0	12/11
Slovenija	SL1	7	4	18	24	33.3	73	85	16.4	2	0	2
Spain	ES1	2	6	7	9	28.6	24	25	4.2	3/4	0	3/4
Spain	ES2	7	6	30	23	−23.3	84	71	−15.5	3	0	3
Sweden	SE1			19	25	31.6	76	102	34.2	100/35	0	100/35

Table 1. continued

(c)

		Donation and coordination										
		Refusals		Utilized donors			Organs recovered			Total donation coordinators	Full time 2007/	Part time
Country	TA ID	2007	2009	2007	2009	%	2007	2009	%	2007/2009 S1/S2	2009 S1/S2	2007/2009 S1/S2
Turkey	TR1	23	28	20	20	0.0	46	46	0.0	7	7	0
Turkey	TR2	49	57	24	18	−25.0	88	48	−45.5	7/5	2/3	5/2

(d)

	2007	2009	*P*
Refusals	15.4 ± 16.0 (0–52)	17.2 ± 17.4 (1–58)	0.218
Utilized donors	15.7 ± 14.3 (2–69)	20.0 ± 17.1 (1–78)	0.014
Organs recovered	49.7 ± 48.6 (0–228)	59.3 ± 52.2 (2–247)	0.044
Total donor coordinators	9.2 ± 19.7 (0–100)	6.4 ± 8.0 (0–35)	0.310
Full time donor coordinators	2.2 ± 4.7 (0–23)	2.4 ± 5.4 (0–27)	0.284
Part time donor coordinators	7.0 ± 19.7 (0–100)	4.0 ± 7.0 (0–35)	0.276

*Data changed from 0 to 2 donors and from 0 to 4 recovered organs, respectively.

that the objectives of the training course were accomplished (Table 4).

Table 5 summarizes the final results, profiles, and specialties of participants who attended the five online modules of the 'Professional Training on Organ Donation' program. As seen, there is a wide range of specialties involved. However, the most important group comes from ICU (28.9%), followed by Tx coordination (23.7%). A great majority were physicians (92.1%).

We could not find any correlation between the scores obtained by the participants in the 'Professional Training on Organ Donation' program and the changes reported in brain death diagnoses, number of utilized donors, and number of organs recovered. No correlation between course results (scores) and outcome in terms of number of donors detected or organs recovered has been established.

Table 6 summarizes the profile of the participants who attended the Organ Donation Quality Management course and lectures evaluation.

Discussion

ETPOD was a successful training program, which, by implementing a three-level training program in organ donation, achieved a significant improvement in both numbers of utilized donors and organs recovered.

For the first time, a need analysis has been carried out and a Training Program developed in compliance with the training needs of the health professionals involved in the various stages of the organ donation process.

Although multifactor approaches [29] are required to tackle the issue on different levels (including social awareness, mass media campaigns and legislative modifications), the training of professionals active in the field of organ donation and transplantation is highlighted as a major factor in maximizing deceased donor potential and eventually increase donation rates. As proven by Knowles, adults have the psychological need to actively participate in and direct their own education, learning in the most effective way when the information is presented in the context of a real-life situation [32]. Therefore, the TPM experiential learning model based on blended methodology (e-learning and face-to face) was used to implement ETPOD. Hence, education in the field is possible at large scale. While 51 participants attended the Training for Trainers, 49 the Professional Training on Organ Donation, and 23 participants attended the Organ Donation Quality Managers, the EOD seminars reached out 3163 participants. The training program covered different important professional profiles as following: Healthcare professionals in targeted donor units, such as Intensive Care, Postoperative Recovery and Emergency Room departments; Healthcare professionals in charge of managing the whole organ donation process, those owing

Table 2. Number of EOD seminars and participants in each target area. EOD seminars content, lectures and postlecture discussions were scored by participants on a 1–5 scale (1-poor and 5-excellent). (Data expressed as number of cases (*n*) or mean ± Standard deviation; blanks = missing data).

TA	Country	Seminars (*n*)	Participants (*n*)	Contents evaluation score	Presentations evaluation score	Post-lecture discussions score
AU1	Austria	4	98	–	–	–
BG1	Bulgaria	1	106	–	–	–
CY1	Cyprus	1	30	–	–	–
DE1	Germany	3	47	3.7	3.1	3.3
DE2	Germany	2	61	3.9	3.9	3.9
DE3	Germany	3	66	3.1	3.2	3.1
EE1	Estonia	4	176	4.6	4.5	4.6
ES1	Spain	2	120	4.0	4.1	4.2
ES2	Spain	1	142	4.3	4.5	4.5
GR1	Greece	2	110	4.5	4.4	4.5
GR2	Greece	2	120	4.5	4.4	4.5
IT1	Italy	4	103	4.2	4.3	4.1
IT2	Italy	3	122	4.3	4.3	4.1
LT1	Lithuania	3	239	4.4	4.4	4.5
PL1	Poland	2	59	4.3	4.0	4.2
PL2	Poland	2	213	4.3	4.3	4.2
PL3	Poland	3	168	4.2	4.2	4.3
PT1	Portugal	3	162	–	–	–
RO1	Romania	3	180	4.4	4.4	4.2
RO2	Romania	1	60	3.7	3.7	3.7
SK1	Slovak Rep.	1	45	3.9	3.9	4.0
SL1	Slovenia	4	285	4.7	4.7	4.7
SE1	Sweden	4	234	4.2	4.2	4.3
TR1	Turkey	1	101	4.1	4.1	4.0
TR2	Turkey	1	116	–	–	–
Total		60	3163	4.2 ± 0.4	4.1 ± 0.4	4.1 ± 0.4

to join a Transplant Coordination Office and Key Donation Professionals' (KDP) wishing to update their knowledge and reinforce their competences as well as Donor program managers responsible for national, regional, local, and/or hospital organizations with high activity in organ recovery and transplantation.

Several limitations to our study have been identified while analyzing the project results. TAs profiles did not reveal homogeneous results. They differed in population size, health care system (expressed as number of hospitals involved, number of ICU beds, etc.), legislation, organ donation organizational structure and resources, etc., which may explain why the initial results and data evolution varied significantly between TAs.

A further proactive search shall be carried out to identify whether transplant donor coordinators work full time or part time, inside ['Action Plan on Organ Donation and Transplantation (2009–2015)'] or outside donor hospitals, whether these professionals cover one or more hospitals with organ donation potentiality, what their background is, whether they have been trained and what type of support acquire from upper structures involved in organ donation. In general terms, it has been suggested that an increased number of coordinators could improve the rate of organ donors in a given area [33,34]. For this reason, we considered important to include this parameter in the study. It is interesting though to remark that the increase in donation rates was not because of a higher number of coordinators in the TAs.

We consider that the increased awareness, commitment, knowledge, and skills of the professionals involved in the study could explain better results, despite a reduced number of coordinators.

Moreover, it is possible that the different TAs put unequal effort into multiplying the training programs despite the special attention paid during study participants' selection. However, we did not find any correlation between the course results (scores) reported and the outcome in terms of number of donors detected or organs recovered. With this regard, the evaluation of any of the training programs developed and its correlation with the training applicability remains unresolved.

On the other side, TAs are not necessarily representative for their countries. It means that results cannot be extrapolated to other areas than the ones assessed. However, considering the different sizes and profiles of TAs, this training program seems feasible for regions and countries of different sizes, with diverse structure and investment in health.

Such a high impact on organ donation parameters proves the effectiveness of the ETPOD training program. After the official closure of the project, participants from 22 countries,

Table 3. Characteristics of participants in the EOD seminars. EOD tests evaluation report. Data expressed as number of cases and percentages.

	n	%
Participants Professional background		
Manager	34	2.5
Nurse	648	48.5
Clinical Laboratory Technician	51	3.8
Physician	396	29.7
Administration	16	1.2
Others	190	14.2
Involvement level in the donation-transplantation process		
Critical care, Intensive Care Unit, Emergency room	695	53.9
Recipients Transplant Coordinator	17	1.3
Recovery Team: Surgery	112	8.7
Donor coordinator	23	1.8
Recovery Team: Anesthesia	94	7.3
Others	348	27.0
After seminar, attitude towards donation changed positively		
Strongly Agree	490	37.7
Somewhat Agree	524	40.3
Neither	259	19.9
Somewhat Disagree	21	1.6
Strongly Disagree	7	0.5
Evaluation test questions answered by participants		
Correct	26 718	74.0
Incorrect	8968	24.8
Not-answered	433	1.2

Table 4. Participants profile in the 'Training for Trainers' course, number of certified participants and participants' course evaluation results. Scoring was performed on a 1–5 scale (1 – poor and 5 – excellent). Data expressed as number of cases and percentages or mean ± standard deviation.

Face-to-face participants	*n*	%
Profile		
Medical Doctor	33	76.7
Registered Nurse	2	4.7
Other	8	18.6
Specialties		
Intensive Care	16	37.2
Transplant Coordination	12	27.9
Surgery	8	18.6
Anesthesiology	6	14
Traumatology	1	2.3
On-line participants		
Certified (n)	37	72.55
On-line course	Training	Activities
Presentation	4.0 ± 0.1	3.9 ± 0.2
Structure	3.9 ± 0.1	3.8 ± 0.2
Content	4.0 ± 0.1	3.8 ± 0.3
Objectives accomplished	3.8 ± 0.5	3.9 ± 0.3

Table 5. Professional Training on Organ Donation Program. Participants' final results, profiles and specialties. Blanks were left where information was not provided.

Country	TA	Final course results
Austria	AU1	7.4 ± 0.4
Bulgaria	BG1	2.5 ± 3.5
Cyprus	CY1	8.0 ± 0.1
Germany	DE1	3.6 ± 3.1
Germany	DE2	1.5 ± 1.5
Germany	DE3	3.9 ± 4.1
Estonia	EE1	8.1 ± 0.3
Spain	ES1	4.1 ± 2.3
Spain	ES2	2.4 ± 2.9
Greece	GR1	1.0 ± 0.7
Greece	GR2	1.6 ± 0.21
Italy	IT1	1.5 ± 2.1
Italy	IT2	4.7 ± 2.9
Lithuania	LT1	8.4 ± 0.1
Poland	PL1	4.2 ± 3.6
Poland	PL2	4.2 ± 2.8
Poland	PL3	5.4 ± 2.5
Portugal	PT1	4.2 ± 6.0
Romania	RO1	8.9 ± 0.2
Romania	RO2	5.2 ± 2.3
Sweden	SE1	3.6 ± 5.0
Slovenia	SL1	8.3 ± 0.5
Slovak Rep.	SK1	-
Turkey	TR1	5.4 ± 2.1
Turkey	TR2	5.3 ± 3.6
	n	%
Participants profile		
Medical doctor	35	92.1
Registered Nurse	3	7.9
Specialties		
Anaesthesiology	4	10.5
Cardiology	1	2.6
ICU	11	28.9
Nephrology	2	5.3
Neurology	2	5.3
Neurosurgery	3	7.9
Registered Nurse	3	7.9
Surgery	3	7.9
Tx Coordination	9	23.7

belonging to the European Transplant Network and the Mediterranean Transplant Network, have benefitted from the Training for Trainers Programs. The educational tool developed is implemented further on by the ETPOD participants. New TAs are being established and EOD seminars carried out. Educational materials are being translated and adapted to the reality and needs of new countries involved. A database has been created (http://www.etpod-dissemination.eu) to follow-up EOD seminars and their impact on organ donation. Up to now, 152 EOD seminars have been carried out and 7836 healthcare professionals from 17 different countries from Africa, America, and Europe have been trained.

To improve donation rates and overcome organ shortage, a multifactor approach is required, tackling mainly the social, legal, and medical aspects. However, the effort to

Table 6. Organ Donation Quality Management Program. Participants' profile (gender, origin, academic background, professional position) and lectures evaluation. Data expressed as number of cases and percentages. Scoring for lectures evaluation was performed on a 1–5 scale (1 – poor and 5 – excellent).

Participants' profile (n = 23)		
Gender (M/F)	14/9	
Origin	*n*	%
Austria	1	4
Bulgaria	1	4
Cyprus	1	4
Estonia	1	4
Germany	3	13
Greece	2	9
Italy	2	9
Lithuania	1	4
Poland	3	13
Portugal	1	4
Romania	2	9
Slovenia	1	4
Slovak Republic	1	4
Sweden	1	4
Turkey	2	9
Academic background		
Physician	15	65
Nurse	5	22
Economist	2	9
Management	1	4
Professional Position		
Transplant Coordination	7	30
Director	4	17
Consultant	3	13
Others	9	39
Lecture evaluation		
Contents	Presentation	Questions answered
4.25	4.27	4.31

increase specialized training among healthcare professionals has proved its efficacy in organ donation.

Further improvements are suggested concerning the identification and use of clinical indicators to establish baseline performance and assess the effectiveness of proposed quality improvements [35–37], the extension of educational programs in organ donation, and the homogenization of results in Europe and worldwide.

In conclusion, ETPOD is a successful training program by having created quality educational materials with the support of the project participating organizations and the recognition of the European Commission through its 'Action Plan on Organ Donation and Transplantation (2009–2015)'. It resulted in identifying the educational needs of healthcare professionals involved in the organ and tissue donation process and implementing effective training programs with a positive impact upon donation parameters.

Authorship

MM, GP: designed and performed the study. XG: designed and performed the study; analyzed data. RV: designed and performed the study; analyzed data; wrote the manuscript. MI: performed the study, wrote the manuscript. ETPOD partner consortium (see Acknowledgements for the full list): collected and analyzed data, designed, developed and performed the study.

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