

ORIGINAL ARTICLE

Critical Care staffs' attitudes, confidence levels and educational needs correlate with countries' donation rates: data from the Donor Action[®] databaseLeo Roels,¹ Caroline Spaight,¹ Jacqueline Smits² and Bernard Cohen¹¹ Donor Action Foundation, Linden, Belgium² Eurotransplant International Foundation, Leiden, The Netherlands**Keywords**attitudes, brain death, Donor Action[®], organ donation.**Correspondence**

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Summary

To investigate on the impact of Critical Care (CC) staffs' attitudes to donation, their acceptance of the brain death (BD) concept, their confidence with donation-related tasks and educational needs on national donation rates. Donor Action (DA) Hospital Attitude Survey (HAS) data were collected from 19 537 CC staff in 11 countries, including personal attitudes to donation, self-reported knowledge, involvement and comfort levels with donation-related tasks and educational requirements. Countries' donation performance was expressed as Procurement Efficiency Index (PEI) (organs procured and transplanted/deaths from eligible causes). National PEI rates correlated well with CC staffs' average support to donation ($R = 0.700$, $P = 0.014$), acceptance of the BD concept ($R = 0.742$, $P = 0.007$), confidence levels ($R = 0.796$, $P = 0.002$) and average educational requirements with donation-related tasks ($R = -0.661$, $P = 0.025$). Nurses reported significantly lower positive attitudes ($P < 0.0001$), acceptance of the BD concept ($P < 0.0001$), comfort levels ($P < 0.0001$) and requested more education ($P = 0.0025$) than medical staff members. DA's HAS is a powerful, standardized tool to assess CC staffs' attitudes and donation-related skills in different environments. Measures to improve countries' donation performance should focus on guidance and education of CC staff so as to ensure that all practitioners have sufficient knowledge and feel comfortable with donation-related issues.

Introduction

Improving knowledge of transplant immunology processes, better immunosuppressive agents and more sophisticated surgical techniques have resulted in recent years that organ transplantation is becoming the victim of its own success. The ever growing gap between the number of organs available and the number of patients waiting for a suitable transplant keeps limiting the application of this life-saving technology.

At the same time, however, recent large-scale medical audits confirm earlier findings that the potential for donation from deceased donors remains significantly

under-exploited because of less than optimal identification and referral of potential donors, together with disappointing consent rates [1–3].

Multiple initiatives have been introduced in recent years, with the aim of increasing organ donation from deceased donors [4]. One of these initiatives is the Donor Action[®] (DA) Program, launched in the mid-1990s as a joint effort from three leading organizations to tackle the global problem of organ shortage [Eurotransplant International Foundation (The Netherlands), Organización Nacional de Trasplantes (Spain) and the Partnership for Organ Donation (USA); <http://www.donoraction.org>, accessed 10 June 2009] [5,6].

The study presented aims at investigating on the impact of Critical Care (CC) staffs' attitudes to organ donation, their acceptance of the brain death (BD) concept, their self-reported skills and educational needs on national donation rates. Data were collected from 11 countries and entered into the DA System Database for further analysis.

Materials and methods

The DA Program takes a systematic approach towards achieving quality in the donation process. Its DA Diagnostic Review methodology assesses individual hospitals' donation performance and suggests areas for improvement within the donation process. The Diagnostic Review has three components: a Hospital Attitude Survey (HAS), a Medical Record Review (MRR) and a DA System Database to enter and analyse data and report on findings [3,5,6].

The HAS is a simple, 32-item anonymous questionnaire, which is available in multiple languages. It is handed out to CC staff in units conducting an MRR. The HAS assesses their attitudes, knowledge and involvement with donation and also reports on acquired skills and how comfortable practitioners feel with donation-related tasks. It shows the amount of support they receive during the donation process and identifies their needs for further education. The HAS and concurrent MRR establish the baseline for monitoring improvements in the donation process.

The study's HAS data analysis was based on 19 537 returned CC staff survey records (physicians: 3422, nurses: 13 977, others: 2138) in 245 hospitals in 11 countries [Australia ($n = 2908$), Belgium ($n = 4240$), Croatia ($n = 377$), Finland ($n = 267$), France ($n = 3071$), Israel ($n = 1946$), Italy ($n = 1807$), Japan ($n = 2681$), Norway ($n = 282$), Poland ($n = 470$), Switzerland ($n = 1488$)] between November 2006 and October 2008. The overall return rate of distributed surveys was $69.1 \pm 13.9\%$, with highest averages in Poland (89%), Japan (84.7%) and Belgium (80.2%) and lowest in France (57.2%), Italy (56.2%) and Finland (54.4%). For reasons of considerable differences between countries in the participation of auxiliary staff (0% in Israel and Norway, 25% in Japan) and to avoid biases, the study cohort for this analysis was limited to 3422 medical (19.7%) and 13 977 nursing staff (80.3%) only.

As to the average type of CC units surveyed, 60.7% were general ICUs (medical and coronary care units included), 14.5% were surgical ICUs, 9.8% were neurology/neurosurgery ICUs, 8.7% were accident & emergency or trauma units and 3.7% were neonatology or paediatrics ICUs. It should be noted, however, that the number of

specialized ICUs per hospital decreased with diminishing hospital size, with more all inclusive medical/surgical/neurological, coronary and paediatric CC disciplines united in one unit only in smaller hospitals. The average type of a CC unit did not differ between the countries surveyed.

Hospital Attitude Survey data were entered into the DA System Database, a user-friendly web-based relational database system designed to enter, analyse and report on MRR and HAS data. The reporting features provide predefined, single and cross-type reports. The DA System Database is the largest international database of its kind and currently contains over 47 000 HAS and 79 000 MRR records from nearly 400 hospitals in 17 countries (status May 2009).

To compare countries' donation performances with their HAS outcomes, we used the Procurement Efficiency Index (PEI) as defined in earlier publications [7]. This index is a more accurate measure of a country's donation performance as it is based on a census of the dead, rather than of the living [8]. It also refers to the number of actual *transplants* resulting from procured organs, rather than donors. Another reason for this approach is the absence of a uniform international definition of what should be considered as a 'donor'. Some countries, such as Spain, include all patients in their donation statistics from which organs were recovered with the *intention* to transplantation. Most other European countries, included Eurotransplant, the French Agence de la Biomédecine and Scandiatransplant, report only those cases that have resulted in at least one effective organ recovered and transplanted.

Actual PMP transplant figures from procured donors were based on Eurotransplant and the Council of Europe data for the year 2007 [9,10]. Death rates for eligible causes were based on 2004 WHO Global Burden of Disease causes W108 (cerebrovascular diseases), W149 (unintentional injuries) and W156 (intentional injuries) (<http://www.who.int/healthinfo/statistics/bodgbdeathdalyestimates.xls>, accessed 10 March 2009).

Statistical differences between countries (chi-square test, Fisher's exact test where appropriate) or between professional subgroups (paired *t*-test) and correlation *Z*-tests were calculated using STATVIEW[®], version 5.01 (SAS[®] Institute Inc, SAS Campus Drive, Cary, NC, USA). Averages are expressed as mean \pm standard deviation (SD).

Results

Table 1 illustrates the PEI calculation for each country entered to the study. It is based on age-standardized death rates for selected causes (<http://www.who.int/healthinfo/statistics/bodgbdeathdalyestimates.xls>) and the

Table 1. Procurement Efficiency Index (PEI) – 2007.

| Country | Age-standardized death rates for selected causes/100.000 | | | | Organs procured and transplanted in 2007 pmp | PEI |
|-------------|--|------|------|-------|--|------|
| | W108 | W149 | W156 | Total | | |
| Australia | 33.4 | 23.3 | 11.9 | 68.6 | 34.3 | 5.00 |
| Belgium | 39.3 | 25.4 | 36.5 | 101.2 | 99.5 | 9.83 |
| Croatia | 109.5 | 30.6 | 17.4 | 157.5 | 22.2 | 1.41 |
| Finland | 46.1 | 37.8 | 23.4 | 107.3 | 50.8 | 4.73 |
| France | 28.2 | 34.6 | 13.8 | 76.6 | 72.8 | 9.50 |
| Israel | 27.2 | 17.1 | 12.4 | 56.7 | 23.1 | 4.07 |
| Italy | 47.1 | 22.6 | 6.8 | 76.5 | 55.5 | 7.25 |
| Japan | 45 | 20.1 | 19.3 | 84.4 | 1.84 | 0.22 |
| Norway | 42.6 | 23.4 | 11.8 | 77.8 | 58.8 | 7.56 |
| Poland | 78 | 36.4 | 16.9 | 131.3 | 26.0 | 1.98 |
| Switzerland | 26.2 | 17.4 | 14.8 | 58.4 | 40.1 | 6.87 |

number of organs recovered in each country and transplanted in 2007, either in the country itself or elsewhere as a result of international exchange programs [9,10]. PEI rates were highest in Belgium (9.83) and France (9.50) and lowest in Croatia (1.41) and Japan (0.22).

Respondents' demographics

On average, 63.4% of medical staff were men and 82.8% of nursing staff were women. The percentage of male physicians was the highest in Japan (77.7%) and Belgium (68.6%) and the lowest in Croatia (36.7%) and Finland (38.4%). The percentage of female nurses was the highest in Poland (93.5%) and Finland (87.7%) and the lowest in Belgium (70.4%) and Italy (71.9%). Whereas physicians were best represented in the age range of 35–44 years (35.1%), Australian medical staff tended to be younger with their highest representation (31.4%) in the age range of 25–34 years. Italian medical staff on average were older and best represented (35.5%) in the age-group of 45–55 years. No statistically significant differences could be observed between medical and nursing staff in terms of average expertise in donation-related issues.

Attitudes

Details of medical and nursing staffs' attitudes towards donation in participating countries are presented in Table 2. In this part of the HAS survey, four questions reflect respondents' personal attitudes: 'Q1: Do you support donation, in general?', 'Q2: Would you donate your own organs after death?', 'Q3: Would you donate your (adult) relatives' organs after his/her death?', 'Q4: If applicable, would you donate your children's organs after death?'. For all four questions and in all 11 countries,

nursing staff show a significantly lower positive attitude compared with medical staff. Average attitude rates (Q1–Q4) for medical and nursing staff together were the highest in Finland (93.6%) and Belgium (93.2%) and the lowest in Israel (71.8%) and Japan (54.8%). These average attitude rates correlate strongly with countries' PEI figures ($R = 0.700$, $P = 0.014$) (Fig. 1).

Brain death

Support for the statement 'Brain death is a valid determination of death' was the highest in Norway (94.7%) and Belgium (89.7%) and the lowest in Croatia (67.4%) and Japan (36.4%) (average: $79.4 \pm 16.3\%$). In each country and on average, acceptance of the BD concept was significantly lower amongst nursing staff ($77.4 \pm 17.3\%$) compared with medical staff members ($87.2 \pm 9.7\%$) ($P < 0.0001$). Average national medical and nursing staff acceptance rates show a strong correlation with PEI figures ($R = 0.745$, $P = 0.0066$) as illustrated by Fig. 2.

Self-reported confidence levels

Table 3 summarizes the answers to the following survey questions dealing with confidence levels with donation-related tasks:

Q1: *Do you feel comfortable with notifying a transplant coordinator or appropriate person when a patient is identified as a potential donor?*

Q2: *Do you feel comfortable with explaining brain death to the next-of-kin?*

Q3: *Do you feel comfortable with introducing the subject of organ donation?*

Q4: *Do you feel comfortable with obtaining consent for organ donation?*

It is evident that not all staff members are involved in the donation process. When analysing the data for comfort levels, only respondents who expressed their involvement with any step of the donation pathway were included.

As for Q1, Australian (73.1%) and Belgian (72.7%) CC staff felt most comfortable, whereas Croatian (16.0%) and Japanese colleagues (11.4%) felt significantly less comfortable. Average comfort levels were significantly lower amongst nurses (39.4%) compared with medical staff (64.4%) ($P < 0.0001$).

Medical and nursing staff in Norway (67.1%) and Belgium (62.8%) felt quite comfortable with explaining BD to the next-of-kin; whilst only 4% of CC staff in Croatia and 3.3% of Japanese colleagues felt so. Again, major differences could be observed between average medical (58.1%) and nursing staff (27.1%) ($P < 0.0001$). A positive association was observed between PEI rates and

Table 2. Medical and nursing staffs' attitudes towards organ donation and correlation with countries' PEI figures.

| | Medical staff | Nursing staff | Average medical + nursing staff |
|---|---------------|---------------|---------------------------------|
| Q1. 'Support donation, generally' (%) (medical versus nursing staff: $\chi^2 = 132.84, P < 0.0001$) | | | |
| Australia | 96.1 | 91.3 | 93.7 |
| Belgium | 97.3 | 95.8 | 96.6 |
| Croatia | 96.7 | 82.6 | 89.7 |
| Finland | 97.7 | 96.1 | 96.9 |
| France | 94.8 | 92.5 | 93.7 |
| Israel | 92.3 | 84.5 | 88.4 |
| Italy | 95.9 | 90.8 | 93.4 |
| Japan | 83.7 | 69.8 | 76.8 |
| Norway | 98.1 | 97.4 | 97.8 |
| Poland | 92.9 | 91.4 | 92.2 |
| Switzerland | 90.9 | 79.2 | 85.1 |
| Average | 94.2 | 88.3 | 91.3 |
| SD | 4.2 | 8.5 | 6.2 |
| Q2. 'Would donate own organs' (%) (medical versus nursing staff: $\chi^2 = 149.19, P < 0.0001$) | | | |
| Australia | 85.8 | 80.0 | 82.9 |
| Belgium | 93.3 | 89.9 | 91.6 |
| Croatia | 89.2 | 65.3 | 77.3 |
| Finland | 96.5 | 84.4 | 90.5 |
| France | 92.7 | 87.8 | 90.3 |
| Israel | 71.5 | 55.6 | 63.6 |
| Italy | 90.4 | 83.5 | 87.0 |
| Japan | 51.2 | 38.3 | 44.8 |
| Norway | 85.2 | 87.7 | 86.5 |
| Poland | 86.5 | 77.0 | 81.8 |
| Switzerland | 82.8 | 70.2 | 76.5 |
| Average | 84.1 | 74.5 | 79.3 |
| SD | 12.8 | 16.0 | 14.1 |
| Q3. 'Would donate adult relative's organs' (%) (medical versus nursing staff: $\chi^2 = 123.83, P < 0.0001$) | | | |
| Australia | 94.0 | 88.8 | 91.4 |
| Belgium | 94.0 | 91.3 | 92.7 |
| Croatia | 85.0 | 64.9 | 75.0 |
| Finland | 94.2 | 95.0 | 94.6 |
| France | 95.5 | 94.2 | 94.9 |
| Israel | 74.9 | 63.0 | 69.0 |
| Italy | 90.8 | 87.1 | 89.0 |
| Japan | 60.5 | 39.8 | 50.2 |
| Norway | 92.6 | 91.6 | 92.1 |
| Poland | 83.3 | 72.3 | 77.8 |
| Switzerland | 91.4 | 88.7 | 90.1 |
| Average | 86.9 | 79.7 | 83.3 |
| SD | 10.7 | 17.6 | 14.0 |
| Q4. 'Would donate children's organs' (%) (medical versus nursing staff: $\chi^2 = 204.52, P < 0.0001$) | | | |
| Australia | 63.4 | 53.5 | 58.5 |
| Belgium | 72.5 | 60.2 | 66.4 |
| Croatia | 37.5 | 12.0 | 24.8 |
| Finland | 81.4 | 53.6 | 67.5 |
| France | 76.1 | 62.4 | 69.3 |
| Israel | 38.9 | 22.6 | 30.8 |
| Italy | 62.4 | 52.9 | 57.7 |

Table 2. Continued

| | Medical staff | Nursing staff | Average medical + nursing staff |
|---|---------------|---------------|---------------------------------|
| Japan | 19.5 | 11.4 | 15.5 |
| Norway | 70.4 | 60.1 | 65.3 |
| Poland | 46.0 | 17.4 | 31.7 |
| Switzerland | 55.2 | 41.6 | 48.4 |
| Average | 56.7 | 40.7 | 48.7 |
| SD | 19.2 | 20.6 | 19.6 |
| Average (Q1–Q4) medical and nursing staffs' attitudes towards donation and correlation with PEI | | | |
| Australia | | | 88.8 |
| Belgium | | | 93.2 |
| Croatia | | | 79.5 |
| Finland | | | 93.6 |
| France | | | 92.8 |
| Israel | | | 71.8 |
| Italy | | | 89.3 |
| Japan | | | 54.8 |
| Norway | | | 85.4 |
| Poland | | | 82.9 |
| Switzerland | | | 83.7 |
| Average | | | 83.2 |
| SD | | | 11.5 |
| R | | | 0.700 |
| P-value | | | 0.0141 |

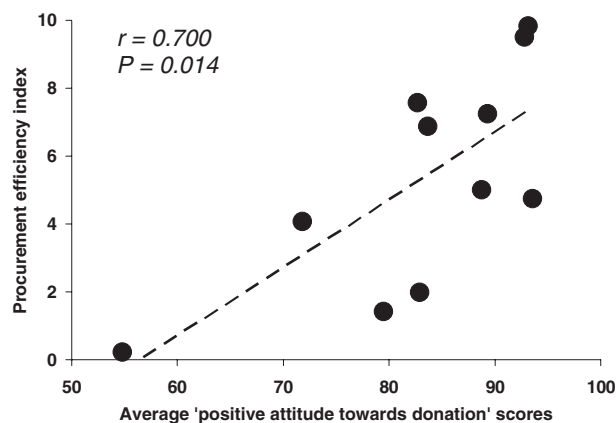


Figure 1 Correlation between staffs' average positive attitudes towards donation and national PEI figures.

confidence levels with explaining BD to the next-of-kin ($R = 0.763, P = 0.0045$).

Belgian (55.7%) and Australian (52.2%) CC staff scored highest with regard to comfort levels with introducing the subject of organ donation. Only 3.3% of Japanese staff members felt so. These comfort levels strongly correlated with countries' PEI ($R = 0.867, P = 0.0002$). Again, medical staff's confidence levels were significantly

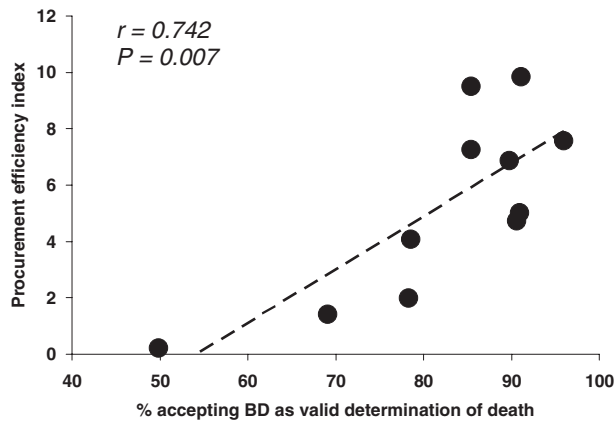


Figure 2 Correlation between staffs' acceptance of brain death concept and national PEI figures.

Table 3. Medical and nursing staffs' self-reported confidence levels with donation-related tasks and correlation with countries' PEI figures.

| | Medical staff | Nursing staff | Average medical and nursing staff |
|---|---------------|---------------|-----------------------------------|
| Q1. 'Feeling comfortable with notifying a transplant coordinator' (%) (medical versus nursing staff: $\chi^2 = 132.38, P < 0.0001$) | | | |
| Australia | 81.9 | 64.3 | 73.1 |
| Belgium | 86.0 | 59.3 | 72.7 |
| Croatia | 25.0 | 7.0 | 16.0 |
| Finland | 69.8 | 35.2 | 52.5 |
| France | 69.0 | 43.7 | 56.4 |
| Israel | 73.4 | 68.6 | 71.0 |
| Italy | 66.2 | 34.3 | 50.3 |
| Japan | 16.7 | 6.0 | 11.4 |
| Norway | 88.9 | 55.7 | 72.3 |
| Poland | 57.9 | 21.2 | 39.6 |
| Switzerland | 74.1 | 38.5 | 56.3 |
| Average | 64.4 | 39.4 | 51.9 |
| SD | 23.4 | 21.7 | 21.9 |
| Q2. 'Feeling comfortable with explaining brain death to next-of-kin' (%) (medical versus nursing staff: $\chi^2 = 586.18, P < 0.0001$) | | | |
| Australia | 77.3 | 45.3 | 61.3 |
| Belgium | 79.6 | 46.0 | 62.8 |
| Croatia | 4.2 | 3.7 | 4.0 |
| Finland | 75.6 | 33.0 | 54.3 |
| France | 69.5 | 28.0 | 48.8 |
| Israel | 63.0 | 30.1 | 46.6 |
| Italy | 55.7 | 21.3 | 38.5 |
| Japan | 5.1 | 1.4 | 3.3 |
| Norway | 88.9 | 45.2 | 67.1 |
| Poland | 46.0 | 13.0 | 29.5 |
| Switzerland | 74.6 | 31.5 | 53.1 |
| Average | 58.1 | 27.1 | 42.6 |
| SD | 28.9 | 15.9 | 22.1 |
| Q3. 'Feeling comfortable with introducing subject of organ donation' (%) (medical versus nursing staff: $\chi^2 = 460.58, P < 0.0001$) | | | |
| Australia | 71.8 | 32.5 | 52.2 |
| Belgium | 72.8 | 38.6 | 55.7 |

Table 3. Continued

| | Medical staff | Nursing staff | Average medical and nursing staff |
|--|---------------|---------------|-----------------------------------|
| Croatia | 13.3 | 7.9 | 10.6 |
| Finland | 60.5 | 24.6 | 42.6 |
| France | 61.7 | 36.9 | 49.3 |
| Israel | 50.7 | 23.7 | 37.2 |
| Italy | 56.3 | 31.8 | 44.1 |
| Japan | 4.7 | 1.8 | 3.3 |
| Norway | 70.4 | 26.3 | 48.4 |
| Poland | 34.9 | 15.9 | 25.4 |
| Switzerland | 63.4 | 24.5 | 44.0 |
| Average | 51.0 | 24.0 | 37.5 |
| SD | 23.4 | 11.6 | 17.2 |
| Q4. 'Feeling comfortable with obtaining consent for organ donation' (%) (medical versus nursing staff: $\chi^2 = 662.03, P < 0.0001$) | | | |
| Australia | 65.3 | 24.6 | 45.0 |
| Belgium | 67.8 | 29.0 | 48.4 |
| Croatia | 3.3 | 6.2 | 4.8 |
| Finland | 62.8 | 16.8 | 39.8 |
| France | 47.9 | 20.6 | 34.3 |
| Israel | 47.2 | 16.7 | 32.0 |
| Italy | 48.3 | 24.2 | 36.3 |
| Japan | 3.7 | 1.6 | 2.7 |
| Norway | 72.2 | 22.8 | 47.5 |
| Poland | 33.3 | 10.6 | 22.0 |
| Switzerland | 53.9 | 11.2 | 32.6 |
| Average | 46.0 | 16.8 | 31.4 |
| SD | 23.8 | 8.5 | 15.7 |

Average (Q1–Q4) of medical and nursing staffs' confidence levels with regard to donation-related tasks and correlation with PEI

| | |
|-------------|--------|
| Australia | 57.9 |
| Belgium | 59.9 |
| Croatia | 8.8 |
| Finland | 47.3 |
| France | 47.2 |
| Israel | 46.7 |
| Italy | 42.3 |
| Japan | 5.1 |
| Norway | 58.8 |
| Poland | 29.1 |
| Switzerland | 46.5 |
| Average | 40.9 |
| SD | 18.9 |
| R | 0.796 |
| P-value | 0.0021 |

higher compared with nursing staff (51% vs. 24%, $P < 0.0001$).

Finally, Belgian (48.4%) and Norwegian (47.5%) CC staff scored highest when asked about their comfort levels in obtaining consent for organ donation; Croatia (4.8%) and Japan (2.7%) scored lowest. Consistent with previous observations, average medical (46%) versus nursing (16.8%) staff's comfort levels differed significantly

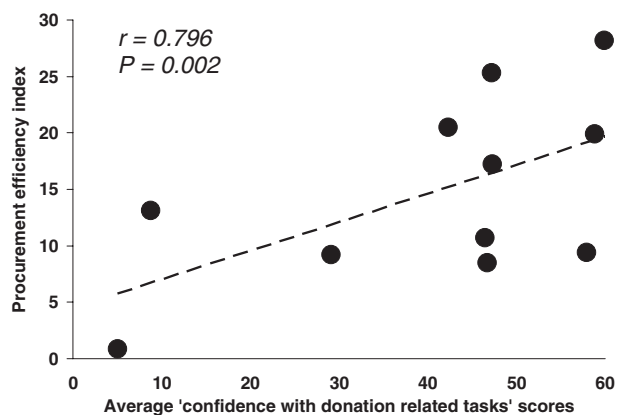


Figure 3 Correlation between staffs' average confidence with donation-related tasks and national PEI figures.

($P < 0.0001$). Average levels of confidence with notifying a TC, explaining BD, introducing the subject of organ donation and obtaining consent significantly correlated with countries' PEI figures ($R = 0.796$, $P = 0.002$) (Fig. 3).

Educational needs

Average rates of medical staff reporting to have received specific training on donation-related tasks correlated positively with national donation performances ($R = 0.608$, $P < 0.05$). On the other hand, medical staffs' self-reported request for further education for four donation-related tasks (clinical donor management, explaining BD to family, obtaining consent and family issues) (Table 4) correlated negatively with PEI figures ($R = -0.661$, $P = 0.025$) (Fig. 4). On average, educational needs were the lowest in Belgium (29.5% of respondents) and the highest in Poland (58.3%) and Japan (50.9%). Significantly more medical staff answered to have received appropriate training on donation-related issues (mean: 26.7%) compared with nursing staff (mean: 19%, $P = 0.0008$). In each country, significantly more nursing than medical staff (average: 54.3% vs. 43.3%, $P = 0.0025$) requested further education.

Discussion

Failures to exploit the potential for organ and tissue donation have been attributed to a number of factors, amongst them being the fact that health care professionals and CC staff in particular have recurrent problems with recognizing a patient as a potential donor, approaching families of medically suitable donors and obtaining consent for donation [11–14].

Discussing severe brain injury, BD and organ donation with families is a specialized form of end-of-life decision-

Table 4. Average educational needs donation-related issues and correlation with countries' PEI figures.

| | Medical staff | | Nursing staff | |
|-------------|---------------|--------------|---------------|--------------|
| | % have | % would like | % have | % would like |
| Australia | 35.2 | 37.9 | 23.1 | 52.5 |
| Belgium | 33.4 | 29.5 | 17.5 | 55.4 |
| Croatia | 28.9 | 39.0 | 28.9 | 39.6 |
| Finland | 26.3 | 43.0 | 24.0 | 64.5 |
| France | 24.6 | 40.6 | 11.2 | 50.0 |
| Israel | 30.7 | 45.8 | 28.0 | 54.2 |
| Italy | 30.0 | 42.3 | 16.3 | 54.1 |
| Japan | 4.8 | 50.9 | 2.8 | 57.5 |
| Norway | 34.7 | 39.3 | 25.9 | 62.0 |
| Poland | 20.3 | 58.3 | 13.4 | 61.4 |
| Switzerland | 25.4 | 43.5 | 17.5 | 46.4 |
| Average | 26.7 | 42.7 | 19.0 | 54.3 |
| SD | 8.6 | 7.4 | 8.0 | 7.3 |

Medical staffs' educational needs (% of respondents requesting additional training on donation-related tasks) and correlation with PEI

| | Clinical donor management | Brain death | Obtaining consent | Family issues | Average |
|-------------|---------------------------|-------------|-------------------|---------------|---------|
| Australia | 41.4 | 34 | 37.6 | 38.6 | 37.9 |
| Belgium | 29.4 | 23.6 | 31.4 | 33.5 | 29.5 |
| Croatia | 39.2 | 28.3 | 45 | 43.3 | 39.0 |
| Finland | 44.2 | 34.9 | 43 | 50 | 43.0 |
| France | 42.9 | 31 | 40.6 | 47.7 | 40.6 |
| Israel | 47.8 | 39.7 | 46.8 | 48.7 | 45.8 |
| Italy | 40.8 | 42.4 | 43 | 43 | 42.3 |
| Japan | 50.2 | 49.3 | 50.7 | 53.5 | 50.9 |
| Norway | 44.4 | 25.9 | 42.6 | 44.4 | 39.3 |
| Poland | 54.8 | 47.6 | 65.9 | 65 | 58.3 |
| Switzerland | 44.4 | 33.6 | 42.7 | 53.4 | 43.5 |
| R | 0.613 | 0.628 | 0.684 | 0.596 | 0.661 |
| P-value | 0.043 | 0.037 | 0.018 | 0.052 | 0.025 |

'Received appropriate training': medical versus nursing staff: $t = 4.696$, $P = 0.0008$; 'Would like to receive more training': medical versus nursing staff: $t = 4.01$, $P = 0.0025$.

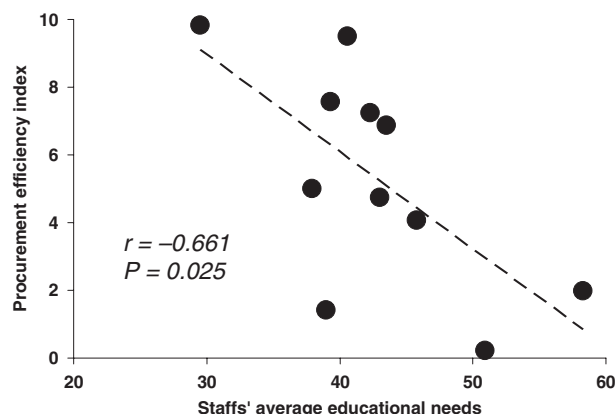


Figure 4 Correlation between staffs' average educational needs and national PEI figures.

making and care in the CC. The knowledge, skills and attitudes necessary for physicians and nurses to good end-of-life decision-making are widely variable [15–21].

A possible association between CC staffs' attitudes towards donation, their confidence levels with donation-related tasks and subsequent outcomes of the donation process has been addressed fragmentarily in a number of studies [11,12,22].

The study presented aimed at an in depth analysis of this association in different sociocultural environments and geographical areas. It is the first and largest international study that has mathematically confirmed earlier assumptions or isolated findings of a link between health care professionals' attitudes (Table 2), acceptance of the BD concept (Fig 2) and confidence levels (Table 3) and a successful conversion of potential into actual donors.

Interestingly, average support to donation decreased in all countries and amongst all professional categories as questions became more personal, from 91.3% (general support), to 81.2% (would donate own organs), to 79.3% (would donate relatives' organs) and only 48.7% (willing to donate children's organs) (Table 2). These figures correlate with those of an earlier study amongst CC nurses in both a trauma centre and a private hospital: 95% showed a strong positive attitude towards the concept of donation; however, only 85% would donate their own organs and only 65% would donate organs from a family member [23]. A Danish survey even demonstrated that only 49% of CC staff would donate their own organs compared with 74% of the general public [24].

The study confirms earlier observations that CC staff who rated themselves more comfortable answering families' questions about donation will be more successful in obtaining consent [12].

The acceptance of BD as a valid determination of death is key to feeling comfortable with donation-related tasks, such as approaching relatives in emotionally strained situations, explaining BD and obtaining consent to donation [14,25,26]. The current study demonstrates, on an international scale, the strong association between comfort levels with the BD concept and successfully converting potential donors into real donors.

In this context, it is worth mentioning that attitudes to organ and tissue donation amongst hospital staff are likely to mirror those found in the general public and therefore influenced by sociocultural and religious impediments to donation. The study presented covered a large geographical area with several countries in different continents, each with its own cultural background and different religions, for e.g. Roman and Orthodox Catholicism to Protestantism, Islam, Judaism, Buddhism, Shintoism and Confucianism. Although it was beyond the scope of

this study, earlier findings from our group and others identified a significant correlation between countries' cultural and religious backgrounds and CC staffs' attitudes towards BD, donation and subsequent hospitals' donation performances [27,28].

Even in countries with a high support for donation and skilled health care professionals, optimal donor identification, referral and maintenance may be limited by insufficient resources, such as lack of ICU beds and/or lack of skilled personnel, as suggested by some authors [29,30]. Unfortunately, insufficient information on the number of staffed CC beds per service area in hospitals surveyed did not allow for confirming such association.

In all 11 countries surveyed, nursing staff showed a significantly less positive attitude towards donation, confidence with the BD concept and donation-related tasks in general compared with medical staff. This observation confirms earlier European HAS surveys in individual countries [15,16,24]. The reason for this finding may be multi-factorial. At least one study identified a distinctively lower involvement of nurses in the donation process compared with physicians to be at the origin of this phenomenon [16]. For this reason, only respondents who reported their active involvement in the donation process were included in this study. Another study reveals that physicians view themselves as the primary professional responsible for identifying and approaching a family for donation [31]. When medical staff members claim family approach and donation requests to be their privileged tasks, one can expect nursing staff to avoid cognitive dissonance within the team and hesitate to take a proactive role [16]. Cognitive dissonance amongst nurses has been documented to affect care delivered during the donation process [32]. Nurses are relied on to have positive attitudes towards donation as 'vital links' in encouraging others to donate [18]. Experiences of moral distress during donation processes have implications that extend well beyond job satisfaction and retention. Strategies to mitigate moral distress should be further developed [33].

Critical Care nurses may either deal with only the donor side of the transplant process, or may be confronted with both an emotional donation process and – within a few hours – be faced with possible poor choices of a transplant recipient and subsequent complications after transplantations. These are factors that can develop a negative attitude to donation, although aggregated data from this study do not substantiate this assumption. In CCUs dealing with both donors and recipients, a systematic and regular feedback of both successful and problem transplant cases will definitely help alleviate misconceptions.

The current study demonstrates, on an international scale, the strong association between CC staffs' educational level and needs with regard to donation-related tasks and success rates of donation programs. It has been suggested that knowledge and attitudes are interrelated and can impact on outcomes, depending on positive or negative perspectives that physicians or nurses have associated with organ donation [23]. Experience and training enhance their confidence in approaching families. Those who feel insecure and uncomfortable making the request have more refusals than those who do not [18,22,24,25,34]. Educating doctors and nurses about the criteria for organ and tissue donation and underlining their role in making the request, have led to measurable increases in donation [17]. One of the most successful international training initiatives ever developed to address educational needs of CC staff who need to break bad news, care for the bereaved, and request donation is the European Hospital Education Program (EDHEP) [35–38]. Originally designed in the early 1990s by Eurotransplant as a training program to reduce refusal rates, it was further developed as an adaptable prototype allowing for adjustments to meet national demands. Interactive workshops, moderated by qualified trainers and psychologists, are available to CC staff that wish to sharpen their communication skills, heighten their sensitivity to the needs of the bereaved and improve techniques of successfully requesting consent for donation. Several countries have anecdotally reported increases in donation following the implementation of EDHEP [16,37]. DA strongly advocates EDHEP as one of its improvement measures for hospitals, regions or countries requesting training on the issue of family care and communication.

In conclusion, DA's Diagnostic Review HAS has proven to be a unique tool to assess CC staffs' attitudes, knowledge and comfort levels with regard to donation-related tasks, confidence with the BD concept, received education and requests for further training. Moreover, HAS outcomes are strongly associated with national donation rates, as demonstrated in this study. Measures to improve countries' donation performance should focus on guidance and education of CC staff so as to ensure that all practitioners have sufficient knowledge and feel comfortable with donation-related issues.

Authorship

LR: designed the study and wrote the manuscript. LR and CS: collected the data. LR and JS: analysed the data. JS: reviewed the statistical analysis. CS, JS and BC: reviewed the manuscript.

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