Recommendations for further improvement of the deceased organ donation process in Belgium

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Recommendations for further improvement of the deceased organ donation process in Belgium

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Belgium has achieved high deceased organ donation rates but according to the medical record data in the Donor Action database, deceased potential donors are still missed along the pathway. Between 2010 and 2014, 12.9 ± 3.3% of the potential donors after brain death (DBD) and 24.6 ± 1.8% of the potential donors after circulatory (DCD) death were not identified. Conversion rates of 41.7 ± 2.1% for DBD and 7.9 ± 0.9% for DCD indicate room for further improvement. We identify and discuss different issues in the monitoring of donation activities, practices and outcomes; donor pool; legislation on deceased organ donation; registration; financial reimbursement; educational and training programs; donor detection and practice clinical guidance. The overall aim of this position paper, elaborated by a Belgian expert panel, is to provide recommendations for further improvement of the deceased organ donation process up to organ procurement in Belgium.

Keywords: Tissue and organ procurement, Deceased donation, Donation after brain death, Donation after circulatory death, Critical care

Introduction

Organ transplantation is the preferred therapy for many patients with end-stage diseases since both survival rates and quality of life are superior in allograft recipients as compared to similar patients without transplantation.1,2 However, insufficient availability of donor organs to meet the existing demand is a major issue in the field of transplantation.3 More than 1200 people in Belgium,4 65,000 in the European Union5 and 78,000 in the United States6 are currently on waiting lists for a lifesaving organ transplant. Unfortunately, each year between 80 and 120 patients die while on Belgian waiting lists.7 Belgium, a country with a proactive donor legislation for the last 30 years, reported an average of 26.7 deceased donors per million inhabitants over the last decade, within the top five highest donor recruitment rates worldwide.4,7 The legislative framework together with local, regional and national initiatives by the Belgian Transplantation Society (BTS) and its section of transplant coordinators on the one hand and the national awareness campaign (BELDONOR) on the other hand, positively impacted on donor numbers (Fig. 1). Within the BELDONOR campaign, the GIFT project was launched in 2006 to focus on the commitment of health care professionals in intensive care and/or emergency units of acute hospitals. Through this project, the department of Health Care of the Belgian federal government intended to identify the bottlenecks in organ donation in order to optimize donor identification.8 But in spite of these favorable donor rates, medical record review data showed that deceased potential donors are missed along the donation pathway.
because of lack of identification or referral, failure to approach relatives or objections to donation. In accordance with the European directive 2010/45/EU, the GIFT project was strengthened in 2012 by the implementation of a local donor coordination function in every hospital with a potential for organ donation, coupled with a cooperation agreement with a transplant center.

Monitoring of donation activities, practices and outcomes

Despite international recommendations on their development, quality assurance programs (QAPs) remain limited to a few countries in Europe.9–11 QAPs are an important tool to ensure continuous improvement in the performance of the deceased donation process.11 In Belgium the methodology developed by the Donor Action Foundation was applied as QAP between 2006 and 2015, in order to assess donation performance of individual hospitals. The donor coordinators participating in the GIFT project were asked to yearly register all deaths on their Intensive Care Unit (ICU) in the Donor Action database, using a protected website. This Donor Action program used a systematic approach toward achieving quality in the donation process from deceased donors at hospital level, taking into account the five steps of the donation pathway: donor identification, referral, family approach and consent, donor maintenance and organ retrieval.12

Although this program had the potential to assess individual hospitals’ donation performance, identify bottlenecks and suggest areas for improvement of their donation process,12 it had some disadvantages. There has been no update for many years. When conducting the retrospective medical audit of all deaths in an intensive care unit, a donor coordinator could select, based on the medical and social history, the admission diagnosis, and/or concurrent disease, contraindications for organ and tissue donation. Unfortunately, this list of contraindications was no longer consistent with the internationally accepted criteria. Donor hepatitis C virus seropositivity is for example not an absolute contraindication to organ donation. These organs may be directed for use in hepatitis C virus positive recipients.13–15 A restriction of this list would be appropriate to reveal the true number of potential donors in Belgium. In order to prevent inadequate selection of potential donors, it is advisable that each potential donor should be discussed with the transplant center. The concerned transplant program will decide on the quality of the organs and tissues to be transplanted and the contraindications for organ and tissue donation, taking into account the evolving criteria. Another limitation of this retrospective audit was the lack of external audit of completeness and accuracy of the data collected by the donor coordinators.

The federal government implemented ‘GIFT Action’, a simplified monitoring tool on donor detection aiming at
minimizing administrative workload while collecting more complete and relevant information in 2016.

In the past, most donor hospitals collected the data on donor detection in ICUs only. Inclusion of emergency departments, coronary care units and acute neurological admissions such as in stroke units would probably increase the potential donor pool.16,17

Furthermore, this QAP could be improved by recording of data in two complementary phases. The first phase consists of an internal evaluation or continuous self-reporting which is already carried out by the hospital donor coordinators, using this anticipated sequel of Donor Action. This remains a retrospective analysis of the medical records of deaths in the intensive care unit and other key hospital departments to identify potential donors. Each case should be analyzed to verify whether the potential donor was referred to the transplant center and, if not, the reasons should be recorded. All reasons for non-conversion of potential donors should be assessed and registered: brain death diagnosis not completed, medical unsuitability, donor management problems, family refusals, refusal in state registry, judicial refusal, lack of appropriate recipients or organizational problems.

Similar to the Spanish QAP, a second phase can consist of a periodical external evaluation of the deceased donation process, with three separate goals: firstly, to verify whether the internal evaluation has been properly performed; secondly, to evaluate the performance through the identification of non-referred potential donors and the analysis of other causes for potential donor loss, and, finally, to make recommendations for improvement to be addressed to donor coordinators but also to hospital managers. De la Rosa et al. observed that a merely self-evaluating approach seems to underestimate the donor potential. External audits in Spain revealed that the number of actual donors could increase by 21.6% if all potential donors were identified and preventable losses avoided.18 Similar to Spain, this external evaluation was also included in the methodology of the Organ Donation European Quality System (ODEQUS) project in 2010–2013.19 In Belgium, this external audit component can be carried out by expert donor coordinators coming from a different region.20 The auditor could have for instance a critical care specialist background, with at least 5 years’ experience as donor coordinator, work in an audited hospital and have received specific training in the methodology.18

This auditing model should be based on a set of quality indicators to assess the organizational structures, clinical procedures and outcomes in donor hospitals. This offers the opportunity of using benchmarks and best practices guidance.11,19 Both benchmarks and best practices still need to be defined for Belgium. In contrast to the present situation, this critical data should be published in an annual national report to ensure transparency of practices. Inter alia, these data could be more representative for the number and the causes of losses of potential deceased donors in Belgium, than the yearly published national donation and organ transplantation statistics collected by the section of transplant coordinators of the Belgian Transplantation Society. The latter only include the potential donors who are referred to a transplant center.21–23 In addition to a set of quality indicators to monitor the donation process, indicators should be developed specific to the transplantation process. Accountability of the transplant centers on transplanted organ outcome such as long-term graft and patient survival, delayed graft function, refused and discarded organ rates will not only stimulate the donor hospitals but also increase the transparency for the general public.

Donor pool

Deceased organ donation is possible from donors after brain death (DBD) and donors after circulatory death (DCD). Recently a group of Belgian experts proposed a modification of the Maastricht classification for donors after circulatory death, presented in Table 1. It classifies the DCD on whether the situation is uncontrolled (categories I and II) or controlled (categories III, IV, and V).24

An utilized donor is a donor from whom at least one organ is transplanted.25 In 2015, out of 315 utilized deceased organ donors respectively 209 (66.3%) were DBD and 106 (33.7%) DCD (Fig. 1). Compared to 2011, the DBD donation rate decreased with 19.6% from 260 donors in 2011 to 209 donors in 2015.4 It is essential for all donor hospitals and transplant centers to avoid a further decrease of DBD, because this inevitably leads to less transplantable organs. The average number of transplanted organs is higher in DBD compared to DCD (3.3 vs. 2.3 organs/donor in 2015, respectively).21 Moreover, organs from uncontrolled and controlled DCD may be of inferior quality because they are exposed to an uncontrollable warm ischemia period between switch off of life-sustaining therapies and declaration of death.26–28 The number of DCD has reached its highest number ever. There were respectively 96 controlled DCD category III (awaiting cardiac arrest), 2 controlled DCD category IV (cardiac arrest while brain death), and 8 controlled DCD category V (euthanasia) in 2015.4

We used the medical record review data from 43,389 patients who died in Belgian critical care units, registered in the Donor Action database between 2010 and 2014, to measure whether the potential was adequately converted to donation (Table 2).

On a total of 43,389 patients, 2676 or 6.2% of all ICU deaths had no contraindications for donation, fulfilled the criteria of a brain death diagnosis and hence were considered as a potential DBD. Average conversion rate of potential into utilized DBD was 41.7 ± 2.1% which showed that in the study cohort 58.3 ± 2.1% of the patients without contraindications, fulfilling the criteria of a brain death diagnosis, were missed along the DBD pathway. The main registered reasons were family objection (15.4 ± 1.8%), no identification (12.9 ± 3.3%),
medical unsuitability for donation (10.9 ± 0.9%), treatment withdrawal (9.1 ± 3.5%), failed resuscitation (2.7 ± 0.4%), patient objection (2.4 ± 1.3%), and coroner objection (1.5 ± 0.3%). The reasons of family objection could not be registered in Donor Action.

During the study period, 3520 ventilated patients were considered as a potential DCD whenever the patient was compatible with organ donation on admission and, additionally, the following criteria were met: age ≤70 years, absence of sepsis, multiple organ failure or cancer other than brain tumor as cause of death and entrance to a hospital with a DCD program. Average conversion rate of potential into utilized donors was 7.9 ± 0.9%. This showed that 92.1 ± 0.9% of the potential DCD were missed along the DCD pathway. The main registered reasons were lack of identification (24.6 ± 1.8%), medical unsuitability for donation (10.9 ± 0.9%), treatment withdrawal (9.1 ± 3.5%), family objection (4.0 ± 1.2%), and logistical problems (2.8 ± 0.8%).

In spite of favorable donor rates in Belgium, conversion rates of 41.7 ± 2.1% for DBD and 7.9 ± 0.9% for DCD indicate room for further improvement through optimization of donor detection, family approach and donor management as well as referral of potential donors to a transplant center. Organ procurement organizations in the USA aim to achieve a donor conversation rate for DBD of at least 75%. However, using the parameter of donor conversation rate has also practical limitations, because no uniform definition of a potential organ donor is used in Belgium. As an essential element in striving for self-sufficiency, Belgium should further expand controlled DCD programs into hospitals without a program. Their implementation however should avoid the premature referral of potential DBD (before brain death occurs) as DCD, because DBD are more likely to donate multiple transplantable organs. To support the implementation of DCD programs in hospitals, a national protocol is under development, but still under review by the government and in the meantime not available nor published.

### Legislation on deceased organ donation

At present two types of consent to donation from deceased donors can be distinguished in national legislations: the principle of presumed consent or ‘opting-out’ and explicit consent or ‘opting-in’. The term ‘opting-out’ may be preferred to ‘presumed consent’ because consent is an active process and cannot be assumed. In Belgium, organ donation and transplantation is regulated by the law of 13 June 1986, which installed an opting-out system. Every mentally competent person registered in the Belgian population register (or in the foreigner’s register for at least six months) is considered as a potential donor after death unless refusal has been explicitly expressed. Previous formal objection or consent can be registered in the national register, to be consulted by the physician through a transplant coordinator prior to organ donation. Informal objection can be expressed in any other way, as long as the physician is notified about it. However, similar to almost all European countries, in daily practice health care professionals are always informing the relatives about organ donation despite the opting-out legal framework. Recent amendments to this act were made in 2012 in accordance to the European directive 2010/45/EU. These amendments relate to standards of quality and safety of the organs, as well as their traceability.

To safeguard the wishes of the deceased but in contrast to the previous regulations, a recent amendment imposes a legal requirement to the physician considering organ retrieval to actively inquire about a possible objection for donation expressed by the potential donor. Misinterpretation of this amendment led to the conviction that consent of next of the kin was absolutely needed for proceeding to organ retrieval. This could undermine the highly successful opting-out principle, which was certainly not the goal of this law of 3 July 2012. After the communication to the family and acceptance of the diagnosis of brain death in DBD or that life-sustaining therapies have become futile in DCD, the physician

### Table 1 Belgian modified classification for donors after circulatory death

<table>
<thead>
<tr>
<th>Uncontrolled DCD</th>
<th>Controlled DCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Death on arrival</td>
<td>Includes victims of a sudden death, whether traumatic or not, occurring out of or in the hospital and who, for obvious reasons, have not been resuscitated</td>
</tr>
<tr>
<td>II Unsuccessful resuscitation</td>
<td>Includes patients who have a cardiac arrest and in whom cardiopulmonary resuscitation has been applied and was unsuccessful. Cardiac arrest occurs out of or in the hospital, being attended by healthcare personnel with immediate initiation of cardiopulmonary resuscitation</td>
</tr>
<tr>
<td>III Awaiting cardiac arrest</td>
<td>Includes patients in whom withdrawal of life-sustaining therapies is applied, as agreed on within the healthcare team and with the relatives or representatives of the patient</td>
</tr>
<tr>
<td>IV Cardiac arrest while brain death</td>
<td>Includes patients who have a cardiac arrest during a DBD procedure</td>
</tr>
<tr>
<td>V Euthanasia</td>
<td>Includes patients who grant access to medically assisted circulatory death</td>
</tr>
</tbody>
</table>

Notes: DCD: donation after circulatory death; DBD: donation after brain death.
### Table 2  DBD and DCD pathway in Belgium

<table>
<thead>
<tr>
<th></th>
<th>2010 (as % of potential)</th>
<th>2011 (as % of potential)</th>
<th>2012 (as % of potential)</th>
<th>2013 (as % of potential)</th>
<th>2014 (as % of potential)</th>
<th>Total (as % of potential)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of deaths on ICU</strong></td>
<td>8384</td>
<td>8646</td>
<td>9190</td>
<td>9331</td>
<td>7838</td>
<td>43,389</td>
<td></td>
</tr>
<tr>
<td><strong>DBD in Belgium</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preconditions for brain death (after exclusion of contraindications)</td>
<td>772</td>
<td>832</td>
<td>809</td>
<td>823</td>
<td>685</td>
<td>3921</td>
<td></td>
</tr>
<tr>
<td>Signs of severe brain damage</td>
<td>726</td>
<td>801</td>
<td>762</td>
<td>788</td>
<td>662</td>
<td>3739</td>
<td></td>
</tr>
<tr>
<td>Potential DBD: patients who fulfilled the criteria of brain death</td>
<td>513</td>
<td>566</td>
<td>561</td>
<td>562</td>
<td>474</td>
<td>2676</td>
<td></td>
</tr>
<tr>
<td>Legal declaration of death</td>
<td>351 (68.4)</td>
<td>418 (73.9)</td>
<td>416 (74.2)</td>
<td>392 (69.8)</td>
<td>358 (75.5)</td>
<td>1935 (72.3)</td>
<td>3.1</td>
</tr>
<tr>
<td>Referral to transplant center</td>
<td>268 (52.2)</td>
<td>334 (59.0)</td>
<td>330 (58.8)</td>
<td>296 (52.7)</td>
<td>260 (54.9)</td>
<td>1488 (55.6)</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Utilized DBD</strong></td>
<td>206 (40.2)</td>
<td>253 (44.7)</td>
<td>242 (43.1)</td>
<td>227 (40.4)</td>
<td>189 (39.9)</td>
<td>1117 (41.7)</td>
<td>2.1</td>
</tr>
<tr>
<td>Reasons for no DBD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coroner objection</td>
<td>8 (1.6)</td>
<td>11 (1.9)</td>
<td>8 (1.4)</td>
<td>6 (1.1)</td>
<td>6 (1.3)</td>
<td>39 (1.5)</td>
<td>0.3</td>
</tr>
<tr>
<td>Failed resuscitation</td>
<td>16 (3.1)</td>
<td>12 (2.1)</td>
<td>15 (2.7)</td>
<td>18 (3.2)</td>
<td>12 (2.5)</td>
<td>73 (2.7)</td>
<td>0.4</td>
</tr>
<tr>
<td>Family objection</td>
<td>75 (14.6)</td>
<td>79 (14.0)</td>
<td>77 (13.7)</td>
<td>98 (17.4)</td>
<td>82 (17.3)</td>
<td>411 (15.4)</td>
<td>1.8</td>
</tr>
<tr>
<td>Logistical problems</td>
<td>1 (0.2)</td>
<td>4 (0.7)</td>
<td>0 (0.0)</td>
<td>5 (0.9)</td>
<td>5 (1.1)</td>
<td>15 (0.6)</td>
<td>0.5</td>
</tr>
<tr>
<td>Maintenance problems</td>
<td>0 (0.0)</td>
<td>1 (0.2)</td>
<td>2 (0.4)</td>
<td>0 (0.0)</td>
<td>1 (0.2)</td>
<td>4 (0.1)</td>
<td>0.2</td>
</tr>
<tr>
<td>Medical unsuitability for donation</td>
<td>50 (9.7)</td>
<td>59 (10.4)</td>
<td>65 (11.6)</td>
<td>60 (10.7)</td>
<td>57 (12.0)</td>
<td>291 (10.9)</td>
<td>0.9</td>
</tr>
<tr>
<td>No identification</td>
<td>68 (13.3)</td>
<td>66 (11.7)</td>
<td>95 (16.9)</td>
<td>79 (14.1)</td>
<td>38 (8.0)</td>
<td>346 (12.9)</td>
<td>3.3</td>
</tr>
<tr>
<td>Patient objection</td>
<td>9 (1.8)</td>
<td>15 (2.7)</td>
<td>7 (1.2)</td>
<td>12 (2.1)</td>
<td>22 (4.6)</td>
<td>65 (2.4)</td>
<td>1.3</td>
</tr>
<tr>
<td>Technical problems</td>
<td>1 (0.2)</td>
<td>0 (0.0)</td>
<td>1 (0.2)</td>
<td>0 (0.0)</td>
<td>1 (0.2)</td>
<td>3 (0.1)</td>
<td>0.1</td>
</tr>
<tr>
<td>Treatment withdrawal</td>
<td>78 (15.2)</td>
<td>47 (8.3)</td>
<td>33 (5.9)</td>
<td>46 (8.2)</td>
<td>40 (8.4)</td>
<td>244 (9.1)</td>
<td>3.5</td>
</tr>
<tr>
<td>Other</td>
<td>1 (0.2)</td>
<td>19 (3.4)</td>
<td>16 (2.9)</td>
<td>11 (2.0)</td>
<td>21 (4.4)</td>
<td>68 (2.5)</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>307 (59.8)</td>
<td>313 (55.3)</td>
<td>319 (56.9)</td>
<td>335 (56.9)</td>
<td>285 (60.1)</td>
<td>1559 (58.3)</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>DCD in Belgium</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potential DCD in all hospitals</td>
<td>1064</td>
<td>1204</td>
<td>1177</td>
<td>1125</td>
<td>1016</td>
<td>5586</td>
<td></td>
</tr>
<tr>
<td>Potential DCD in hospital with DCD program</td>
<td>642</td>
<td>713</td>
<td>758</td>
<td>726</td>
<td>681</td>
<td>3520</td>
<td></td>
</tr>
<tr>
<td>Referral to transplant center</td>
<td>78 (12.1)</td>
<td>112 (15.7)</td>
<td>166 (21.9)</td>
<td>129 (17.8)</td>
<td>140 (20.6)</td>
<td>625 (17.8)</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Utilized DCD</strong></td>
<td>45 (7.0)</td>
<td>50 (7.0)</td>
<td>68 (9.0)</td>
<td>57 (7.9)</td>
<td>59 (8.7)</td>
<td>279 (7.9)</td>
<td>0.9</td>
</tr>
<tr>
<td>Reasons for no DCD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coroner objection</td>
<td>1 (0.2)</td>
<td>6 (0.8)</td>
<td>7 (0.9)</td>
<td>6 (0.8)</td>
<td>7 (1.0)</td>
<td>27 (0.8)</td>
<td>0.3</td>
</tr>
<tr>
<td>Failed resuscitation</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (0.1)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (0.0)</td>
<td>0.1</td>
</tr>
<tr>
<td>Family objection</td>
<td>14 (2.2)</td>
<td>37 (5.2)</td>
<td>33 (4.4)</td>
<td>24 (3.3)</td>
<td>33 (4.8)</td>
<td>141 (4.0)</td>
<td>1.2</td>
</tr>
<tr>
<td>Logistical problems</td>
<td>26 (4.0)</td>
<td>13 (1.8)</td>
<td>19 (2.5)</td>
<td>18 (2.5)</td>
<td>22 (3.2)</td>
<td>98 (2.8)</td>
<td>0.8</td>
</tr>
<tr>
<td>Medical unsuitability for donation</td>
<td>184 (28.7)</td>
<td>185 (25.9)</td>
<td>161 (21.2)</td>
<td>169 (23.3)</td>
<td>145 (21.3)</td>
<td>844 (24.0)</td>
<td>3.2</td>
</tr>
<tr>
<td>No identification</td>
<td>148 (23.1)</td>
<td>167 (23.4)</td>
<td>197 (26.0)</td>
<td>196 (27.0)</td>
<td>159 (23.3)</td>
<td>867 (24.6)</td>
<td>1.8</td>
</tr>
<tr>
<td>Patient objection</td>
<td>6 (0.9)</td>
<td>5 (0.7)</td>
<td>5 (0.7)</td>
<td>5 (0.7)</td>
<td>7 (1.0)</td>
<td>28 (0.8)</td>
<td>0.2</td>
</tr>
<tr>
<td>Technical problems</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>2 (0.3)</td>
<td>1 (0.1)</td>
<td>3 (0.1)</td>
<td>0.1</td>
</tr>
<tr>
<td>Treatment withdrawal</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>1 (0.1)</td>
<td>1 (0.0)</td>
<td>0.1</td>
</tr>
<tr>
<td>Other</td>
<td>218 (34.0)</td>
<td>250 (35.1)</td>
<td>267 (35.2)</td>
<td>249 (34.3)</td>
<td>247 (36.3)</td>
<td>1231 (35.0)</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>597 (93.0)</td>
<td>663 (93.0)</td>
<td>690 (91.0)</td>
<td>669 (92.1)</td>
<td>622 (91.3)</td>
<td>3241 (92.1)</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Notes: Patients with preconditions for brain death: patients with a severe brain injury where clinical triggers are registered in the medical records, for example Glasgow Coma Scale <5, no cornea reflex, no pupil reflex ….; DBD: donation after brain death; DCD: donation after circulatory death.
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primary care physician who is also best suited to assess the mental competence of the citizen. Further research should be performed to evaluate the impact of a differentiated choice on donor rates or other factors. As a result of the national awareness campaign, since 2014 positive registrations (229,607 at 03/2016) exceed negative registrations (189,271 at 03/2016). Despite this positive trend, these numbers are only representing 3.8% of the total population and will not impact directly on the donor numbers (Fig. 2).39

Donor coordination function

The donor coordination function is essential to identify and support all steps in the donation process. This function has been widely recognized, as key to improve not only the effectiveness of the process of donation and transplantation, but also the quality and safety of the organs to be transplanted. This is supported at the EU level through the European directive 2010/45/EU.9,10 In accordance with this directive, the Belgian royal decree of 10 November 2012 lays down the norms to be fulfilled by this local donor coordination function. It stipulates that each general hospital, with a recognized intensive and emergency care unit, should have a recognized function of donor coordination, when organ retrieval from deceased donors takes place. This function should be performed by a multidisciplinary team consisting of at least one nurse and one specialist physician with a special professional title in intensive care. One physician and nurse in this team are responsible for the coordination of this team. An intensivist in this team must be permanently on call and able to be present in the hospital within 15 min.40 For many small hospitals with one or two intensivists this is a hurdle because 24/7 attendance cannot be ensured. These hospitals, many of which offered donors in the past, are now excluded from this possibility, as there is no legal framework. Further
improvements could be the adaptation of the normative framework to also include hospitals without a 24-h permanence of an intensivist.

Financial reimbursement
For deceased donation, financial reimbursement of organ donation is regulated by the Belgian national health care system. Donor hospitals receive a budget for the operating costs of the donor coordination function. Besides, they receive a conditional financial support for each procured and transplanted organ to cover the medical, pharmaceutical, and hospital costs needed for the characterization and clinical stabilization of the donor. As such, the relatives of a potential DBD should not have to pay further expenses after declaration of brain death. The procurement team also receives a financial support for each organ used for transplantation. The transplant team receives a financial support for the organization of the transplantation.

This conditional financial support also covers the costs for the characterization and clinical stabilization of a DCD. But in contrast with DBD, where it is well formulated that this support covers the costs after declaration of brain death and the family is exempted from any further costs, this is not described for DCD. For potential DCD it remains unclear at what point the relatives are exempted of further expenses. It would be logical to consider this exemption from the time point of first discussion of the option for DCD with relatives of the potential DCD patient onward and to apply the exemption following effective DCD conversion.

Introduction of quality indicators for organ donation (e.g. number of donors converted/absolute number of potential donors detected) could be (partially) linked to performance-based financing of the donor coordination function, the intensive care unit, an additional intensive care bed, etc. It is likely to be more influential for donor and organ yield than any other measure, but potential disadvantages should be identified. This approach may actually encroach on the delicate balance between respect of the death donor rule, by which patients may only become donors after death on the one hand, and perception or reality of overemphasis on organ recovery by health care professionals on the other hand. Hence, this financial incentive carries a risk of perception of overzealousness and of organ recovery causing a donor’s death and could undermine public trust in organ donation and transplantation.

Educational and training programs
Further educational training of critical care staff is a key to achieving optimal donation performance. These courses aim both at improving knowledge about donation and transplantation as well as changing attitudes toward transplantation. A number of education and training programs were introduced several years ago in Europe. The European Donor Hospital Education Program (EDHEP), a Eurotransplant initiative launched in 1991, is still running and designed to meet the training needs of critical care staff in breaking bad news, caring for the bereaved and requesting donation. This program aims at improving the communication with donor relatives regarding death and donation by providing insight in the grieving process and relatives’ emotional reactions related to the donation procedure. The European Training Program on Organ Donation (ETPOD), supported by the European Union, ended in 2009 and was an initiative that aimed at solving the lack of advanced training programs in the field of organ donation. This program covered different educational levels, from basic knowledge among health care professionals, to specialized training for donor coordinators and hospital managers. A prospective intervention study was performed in 25 target areas with active donor programs from 17 European countries between 2007 and 2009. The number of utilized DBD in the target areas 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) after the implementation of the training program. Through this project the educational needs of health care professionals were mapped and high-quality educational materials were created.

In Belgium, educational initiatives on a national level include an annual GIF'T symposium and regional initiatives with different symposia organized by individual transplant centers. In addition, the government supports EDHHEP as a one-day training program for nurses and physicians. This program was attended in 2013/2014 by 273 health professionals: 90.5% nurses (n = 247) and only 9.5% (n = 26) physicians (annual report of 2013 and 2014 received from MVDV & DVD). Further government investments should focus on more specialist-oriented training programs (e.g. based on ETPOD), particularly of donor coordinators, and the implementation of a structured professional network that incorporates continuous training and performance assessment. Obviously, such an assessment can have a discouraging effect on donor coordinators. Beside the critical care staff, Coucke et al. indicated the need for a special focus on primary care physicians who also want to take up their role in the organ donation and transplantation process in Belgium. This study revealed deficits in the knowledge about brain death and the need for training in the field of organ donation and transplantation, to be achieved through specific courses for medical students and postgraduate training of every primary care physician.

Donor detection
According to our study of the Donor Action database, 12.9 ± 3.3% of the potential DBD and 24.6 ± 1.8% of the potential DCD were not identified in 2010–2014 in Belgium. The underlying causes are yet to be identified. As far as DCD III is concerned, this procedure is ‘younger’
and ICU health care professionals should still become acquainted that DCD III may be part of the end-of-life-care process. In Belgium, organ donation mainly runs in low-volume hospitals. There are 98 of a total of 105 acute care hospitals participating in the GIFT project with only 6 hospitals in 2012/2013 having >10 donors, 9 hospitals with 6–10 donors, 16 hospitals with 3–5 donors, and 67 hospitals with <3 donors per year (Donor Action data received from CH). Because the majority of the Belgian hospitals have less than three donors per year, another hypothesis can be that health care professionals are rarely confronted with their detection.

To improve the detection, a donor coordinator can install a proactive donor detection protocol inside or outside the ICU, which ensures that a potential donor is detected in a timely manner. This is also defined by the law, as one of the tasks of a donor coordinator, namely to develop a common protocol for the intensive care and emergency units on the management of a potential donor.40 This potential donor pool may also be extended by sharing the protocol with coronary care or stroke units, as the admission of potential donors is not restricted to ICU or emergency units.

Uniform definitions should be used to ensure a standardized methodology for detection. Recently, there has been a consensus on a universal definition of a possible or potential deceased organ donor. In this critical pathway for organ donation, the progression is described from a possible to a utilized deceased organ donor. As described by Dominguez-Gil et al., this pathway can provide a tool for prospective identification and referral of a possible donor.24 In order to identify potential donors, the NICE (National Institute for Health and Clinical Excellence) guideline about ‘Organ donation for transplantation: improving donor identification and consent rates for deceased organ donation’ recommends that UK health care professionals should introduce a system of using clinical triggers for impending brain death. These clinical triggers apply to catastrophic brain injury and include absence of one or more cranial nerve reflexes and a Glasgow Coma Scale (GCS) of 4 or less that is not explained by sedation.48 These triggers aim to define a standardized point of referral and observational studies demonstrate a statistical increase in the identification of potential donors when used to screen all intensive care patients.49,50 Since these are sensitive criteria, less potential donors will be missed, but on the other hand, a substantial proportion of these patients will not die or reach the status of DBD. Consensus has to be reached which clinical triggers can be used in the Belgian acute hospitals.

**Practice clinical guidance**

In contrast with other countries, donor coordinators in Belgium have no national reference guidance to a number of critical items, such as identification of potential deceased donors, the approach of family, clinical stabilization of the patient, referral, characterization of the donor and organs, traceability, registration of adverse events and reactions within the existing legal framework. Therefore, they use the guidelines or protocols of the different transplant centers in Belgium. Most of these have been developed within one center over decades, which results in significant variability in the deceased donation process. To establish and maintain a framework for quality and safety that covers all stages of the chain from donation to transplantation, advocated by the Directive,9 further government investments should go to providing evidence-based and best practice guidance at a national level. According to the law, the development of guidelines is shifted to a local level as one of the tasks of the committee of a collaboration association for procurement and transplantation of organs. This collaboration association should exist of health care professionals of at least the following categories: local donor coordination functions; transplant centers; care programs ‘heart and heart/lung transplantation’; emergency care functions; intensive care functions; clinical biology laboratories where HLA tests are conducted; centers for the treatment of chronic renal failure.51

At a national level, guidance can consist of evidence-based statements that assist clinical decision-making (clinical guidelines), statements of intent (policy) and the articulation of national standards against which practice can be benchmarked. Implementation tools such as protocols, algorithms, or checklists should be promoted to support the guidance implementation in donor hospitals. Care pathways and bundles of care can be used.52 The federal government currently supports an implementation study which focuses on the development and standardization of the clinical content of a care pathway for organ donation after brain death, together with a set of indicators to investigate the effectiveness of this care pathway. Because of the lack of well-conducted clinical trials, most of the recommendations in the literature concerning the organ donation process are weakly supported, with most evidence based on surrogate outcomes and retrospective data.53,54 Therefore, with the support of the Belgian Transplantation Society and the Belgian Society of Intensive Care Medicine, a Delphi investigation will be conducted by a panel of Belgian experts to gather consensus about the interventions which should be included in this care pathway.

**Contributors**

Pieter Hoste drafted the manuscript and analyzed the data. Dominique Van Deynse, Didier Ledoux, Christel Huygens, and Marc Van der Ven met provided essential data. Patrick Ferdinand, Eric Hoste, Kris Vanhaecht, Xavier Rogiers, Kristof Eeckloo, Dominique Van Deynse, Koenraad Vandewoude, and Dirk Vogelaers have critically reviewed the paper and contributed to its intellectual content. All
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