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Ari R. Joffe
Roisin Byrne
Natalie R. Anton
Allan R. deCaen

Donation after cardiac death: a survey of university student opinions on death and donation

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A. R. Joffe (✉) · R. Byrne · N. R. Anton · A. R. deCaen
Department of Pediatrics, 3A3 Stollery Children's Hospital, University of Alberta, 8440 112 Street, Edmonton, AB T6G 2B7, Canada
e-mail: ajoffe@cha.ab.ca
Tel.: +1-780-4071673
Fax: +1-780-4073214

Abstract *Objective:* To determine if university students consider the donation after cardiac death donor as dead. *Design:* Survey. *Setting:* University students. *Participants:* Medical ($n = 142$) and nursing ($n = 76$) students in a medical ethics class and philosophy students ($n = 102$). *Intervention:* Survey during class time with four patient scenarios in which a decision was made to donate organs after 5 min of absent circulation. *Measurements and results:* Half the surveys had brief background information, and half had more detailed background information. Responses between groups were compared using the Chi-square statistic. The response rate of 320 students was 100%. In each scenario, 42–51% of those given detailed information strongly agree or agree that the patient is 'definitely dead', versus 55–58% given brief information (ns). When asked in what state this patient is, 26–30% given detailed information chose "dead," versus 41–45% given brief information ($P < 0.025$). Thirty-six to 39% given detailed information strongly agree or agree that the physician was truthful informing the family that at 5 min of absent circulation the patient is definitely dead, versus 48–52% given brief information ($P < 0.01$). On at least one of the scenarios, 65% of those given detailed information, and 50% of those given brief information responded uncertain, disagree, or strongly disagree that the patient is definitely dead ($P < 0.01$). Medical students were significantly less likely to agree that the patients in the scenarios were "dead," or that the physicians were being truthful in describing the patients as dead. *Conclusions:* Most respondents were not confident that a donation after cardiac death donor was actually dead.

Keywords Death · Donation after cardiac death · Organ donation · Public · Survey

Introduction

Many professional groups have endorsed the practice of donation after cardiac death (DCD) as a way to increase organs for transplantation [1–4]. According to the most common application of DCD, a patient is declared dead after absent circulation for 5 min, and organ procurement of kidneys, liver, and sometimes lungs is urgently performed.

There are ethical concerns surrounding DCD. These include potential conflicts of interest regarding the decision to withdraw life support therapies when DCD may be an option, potential compromise of quality end-of-life care, and potential hastening of death due to premortem

interventions to improve organ donation potential [5–9]. One of the most controversial concerns regards the meaning of irreversibility when referring to death. Many have argued for a weak construal of irreversibility, whereby the state *will not* be reversed (i.e., there is a "do-not-resuscitate" order); others argue for a stronger construal, whereby the state *cannot* be reversed even if resuscitation is attempted [10–15].

There are many case reports of the "Lazarus phenomenon" in which a patient is found to have spontaneous circulation, sometimes with a good neurological outcome, after having been declared dead minutes earlier based on absent circulation [16–18]. With resuscitation attempted, absent circulation for over 10 min may be reversible and not associated with inevitable brain death [19–21]. Moreover, by the weak construal of irreversibility, patients in the identical physiological state can be declared dead or alive based on their location and prediction of a future event (attempted resuscitation). For these reasons, it is not clear that a patient is dead at the 5-min time of absent circulation.

Some surveys suggest public support for DCD [22–25]. These surveys usually ask whether a person would be willing to donate organs after death is pronounced by cardiocirculatory criteria. This question is misleading because it avoids the issue of irreversibility. We set out to determine if university students agree that the patient undergoing DCD is dead. Part of this data has been presented in abstract form [26, 27].

Methods

Questionnaire administration

Due to the short time period allotted for the survey, we believe a university level of education was required to absorb the background information. Students in a medical ethics (medical and nursing students) or philosophy class were given the survey during 20 min of class time. A verbal introduction to the survey was given by two of the authors (NA, RB); students were informed that responses are anonymous, will only be reported in aggregate, and that voluntary consent to participate is assumed upon submission of a completed survey. A cover letter emphasized the need to read the background information prior to answering the questions, and that: "the questions are not concerned with the decision to be allowed to die. In each 'scenario' the decision to be allowed to die has already been made and, thus, is not relevant to the questionnaire."

Questionnaire development

To generate the items for the questionnaire, we searched MEDLINE from 1980 to 2005 for articles on DCD. This process was followed by collaborative creation of the background section and questions for the survey by three of the authors. Pilot testing of the survey was done by non-medical, university educated lay-people ($n = 9$), and an ethics professor. Each pilot test was followed by an informal semi-structured interview by one of the authors to ensure clarity, realism, validity, and ease of completion of the questionnaire. After minor modifications, the survey was approved by all of the authors.

Questionnaire content

In random, half the distributed surveys had a brief background section (BI) and the other half had a more detailed background section (DI). The BI described the organ shortage and explained that organ donation after death

Table 1 Summary of the issues presented that are debated regarding organ donation after cardiac death

Issue of debate	In favor of donation after cardiac death	Against donation after cardiac death
Irreversibility		
When is autoresuscitation not possible?	In 108 patients studied so far, this did not occur after 2 min [3, 4, 30]	108 patients is not a large number There are many reports of 'Lazarus Phenomenon' of the heart re-starting on its own over 10 min after CPR was stopped [16–18]
When is the heart being stopped considered irreversible?	Since the patient does not want CPR, loss of circulation is irreversible when autoresuscitation cannot occur (i.e., after 5 min) [1–4]	Death should be an irreversible state: even if we try to reverse it, it should not be possible to reverse it. The loss of circulation is irreversible only after CPR would not be successful in re-starting the heart (i.e., over 15 min) [10–15]
When is the patient brain dead?	This question does not matter, because there are two ways to diagnose death: brain death, or cardiac death, and we are discussing the latter [1–4]	Brain death was accepted as death because it was argued a patient always was dead only after the brain died. This does not occur for at least 15 min after the heart and circulation stop [10–13, 15, 31]
Conflicts of interest	Doctors give the patient's best interests priority in making decisions	Familiarity and desire for organ transplantation may make doctors *unintentionally* biased to promote donation after cardiac death [5–8]

CPR cardiopulmonary resuscitation

Table 2 Survey content: scenarios, statements, and general questions

Scenarios[a]
1. A ventilated man with profound brain injury after a motor vehicle collision
2. A ventilated woman with pneumonia after severe brain injury from a ruptured cerebral aneurysm
3. A ventilated 5-year-old girl with profound brain injury after being hit by a car
4. A ventilator-dependent man left quadriplegic after a motor vehicle collision, with good brain function
Statements
1. This decision to donate organs 5 min after the heart stops should be allowed
2. At this time point, 5 min after the heart stops, this patient is definitely dead
3. At this time point, 5 min after the heart stops, this patient is dead, as good as dead, dying, not dead, or alive
4. The doctors' reassurance that the patient is dead after the 5 min time is definitely true
5. If this patient was a member of your immediate family, you would be willing to donate this patient's organs
General questions
1. You know enough about the criteria of death to judge whether the patients in the scenarios are definitely dead
2. In your opinion, organ donation is an admirable, life-saving practice that should be strongly encouraged
3. *If* the patient in the scenarios was *not* definitely dead when surgery for organ donation started, then the surgery to obtain the donated organs is what actually killed the patient. Had you thought about it this way when you answered the survey?
4. Considering this argument, the decision in the scenarios to donate organs 5 min after the heart stops should be allowed
5. Policy on organ donation after cardiac death should be influenced by the results of surveys like this one

[a] More detail on the scenarios is provided in Appendix Table E1. We presented a scenario of two adults with severe brain injury, one child with severe brain injury, and one adult without brain injury but with high C-spine quadriplegia. This was to determine (a) consistency of responses to patients in the same physiological state and (b) if the background details of the scenario influenced responses

pronounced by cardiocirculatory criteria is possible, and, with consent, is done 5 min after absent circulation. The DI contained additional sections that discussed autoresuscitation (and the 'Lazarus phenomenon'), the construals of irreversibility, the lack of brain death after 5 min of absent circulation, and the potential unconscious conflicts of interest of the physician (Table 1). We presented four patients' scenarios. Each scenario was followed by the same five statements to be answered on a five point Likert-type scale. The final page of the survey asked some general questions, and comfort level in responding to the survey (Table 2). The study was approved by our University health research ethics board.

Statistics

Anonymous data were entered into a computer database (Microsoft Excel; Microsoft Corp, Redmond, Wash). Responses were analyzed using standard tabulations. Variables expressed as percentages were used to report the proportion of respondents with different answers. The responses of the different groups of students (medical, nursing, or philosophy), and the different groups of background information (BI vs. DI) were compared using the Chi-square test, with a $P < 0.05$ without correction for multiple comparisons considered significant. For comparisons, responses were divided into three categories: strongly agree (SA) or agree (A), uncertain (U), and disagree (D) or strongly disagree (SD). For the question about the state of the patient, the three categories were: (a) dead; (b) as good as dead; and (c) dying, not dead, or alive.

Results

During the academic year 2005–2006, the questionnaire was given to 142 medical students (69 with DI, 73 with BI), 76 nursing students (38 with DI, and 38 with BI), and 102 philosophy students (51 with DI, and 51 with BI). There was a 100% response rate among the students surveyed.

Responses to the scenarios: all students

There were no significant differences in the responses to each of the five questions between the four scenarios. When those given DI were compared to those given BI, there were significant differences in the responses to some of the questions. Those given DI were less likely to SA/A that the patient in scenario 1 was definitely dead; that the patient in scenario 1, 2, or 4 was in the state called dead; and to SA/A that the physicians in scenarios 1, 2, 3, and 4 were being truthful in describing the DCD patient as dead at 5 min of absent circulation (Table 3). When given DI and a patient described as dead according to DCD protocols, $\leq$48% of respondents SA/A that the patient is definitely dead, $\leq$30% responded that the patient is dead, and $\leq$39% SA/A that the physicians are being truthful when calling the patient dead. For those given BI, the corresponding figures are $\leq$58, $\leq$45, and $\leq$52%, respectively. More than three quarters of all respondents were willing to allow donation of organs at the 5-min time of absent circulation.

Although the patients in the four scenarios were in the identical physiological state, with absent circulation for

Table 3 Responses of university students to the four scenarios describing patients eligible for donation after cardiac death

Question	Scenario	Detailed background information ($n = 158$)				Brief background information ($n = 162$)				P*
Response		SA/A	U	D/SD	Blank	SA/A	U	D/SD	Blank	
DCD should be allowed	1	133 (84%)	13 (8%)	12 (8%)	0	141 (87%)	14 (9%)	7 (4%)	0	NS
	2	121 (77%)	24 (15%)	12 (8%)	1 (1%)	138 (85%)	15 (9%)	8 (5%)	1 (1%)	NS
	3	108 (68%)	26 (16%)	19 (12%)	5 (3%)	127 (78%)	19 (12%)	16 (10%)	1 (1%)	NS
	4	117 (74%)	16 (10%)	17 (11%)	8 (5%)	134 (83%)	16 (10%)	10 (6%)	2 (1%)	NS
The patient is definitely dead	1	66 (42%)	70 (44%)	22 (14%)	0	92 (57%)	57 (35%)	13 (8%)	0	<0.025
	2	73 (46%)	64 (41%)	19 (12%)	2 (1%)	89 (55%)	61 (38%)	11 (7%)	1 (1%)	NS
	3	76 (48%)	57 (36%)	19 (12%)	6 (4%)	84 (52%)	52 (32%)	15 (9%)	2 (1%)	NS
	4	72 (46%)	57 (36%)	21 (13%)	8 (5%)	89 (55%)	59 (36%)	12 (7%)	2 (1%)	NS
The physicians are being truthful	1	57 (36%)	54 (34%)	47 (30%)	0	79 (49%)	71 (44%)	12 (7%)	0	<0.001
	2	63 (40%)	51 (32%)	41 (26%)	3 (2%)	82 (51%)	64 (40%)	15 (9%)	1 (1%)	<0.001
	3	60 (38%)	56 (35%)	36 (23%)	6 (4%)	84 (52%)	62 (38%)	15 (9%)	1 (1%)	<0.01
	4	59 (37%)	54 (34%)	37 (23%)	8 (5%)	78 (48%)	67 (41%)	14 (9%)	3 (2%)	<0.001
Allow DCD for a family member	1	128 (81%)	22 (14%)	7 (4%)	1 (1%)	129 (80%)	19 (12%)	13 (8%)	1 (1%)	NS
	2	118 (75%)	22 (14%)	14 (9%)	4 (3%)	126 (78%)	23 (14%)	10 (6%)	3 (2%)	NS
	3	104 (66%)	27 (17%)	20 (13%)	7 (4%)	115 (71%)	26 (16%)	19 (12%)	2 (1%)	NS
	4	118 (75%)	17 (11%)	14 (9%)	9 (6%)	124 (77%)	20 (12%)	14 (9%)	4 (2%)	NS
Response		Dead	AGAD	Dy/ND/Al	Blank	Dead	AGAD	Dy/ND/Al	Blank	P
The patient is in what state?	1	47 (30%)	77 (49%)	33 (21%)	1 (1%)	73 (45%)	59 (36%)	27 (17%)	3 (2%)	<0.025
	2	45 (28%)	78 (49%)	34 (22%)	1 (1%)	70 (43%)	62 (38%)	26 (16%)	4 (2%)	<0.025
	3	48 (30%)	71 (45%)	33 (21%)	6 (4%)	67 (41%)	63 (39%)	28 (17%)	4 (2%)	NS
	4	41 (26%)	77 (49%)	32 (20%)	8 (5%)	68 (42%)	59 (36%)	29 (18%)	6 (4%)	<0.025

DCD donation after cardiac death, *SA* strongly agree, *A* agree, *U* uncertain, *D* disagree, *SD* strongly disagree, *Dy* dying, *ND* not dead, *Al* alive

* Comparison of those given detailed background information and those given brief background information, with $P < 0.05$ considered statistically significant

5 min, many respondents did not consistently consider the patients are definitely dead, or in the state called "dead" or "as good as dead" between scenarios (Table 4). Those given DI had significantly more inconsistency in responses, with more participants responding that the patient was in the state called "dead" or "as good as dead" on only some of the scenarios ($P < 0.01$), and fewer responding SA/A that the patient was definitely dead in all of the scenarios ($P < 0.01$) (Table 4). On at least one of the scenarios, 65% of those given DI and 50% of those given BI responded U/D/SD that the patient is definitely dead ($P < 0.01$).

Responses to the general questions: all students

The majority responded SA/A that "organ donation is an admirable life-saving practice that should be strongly encouraged": 289/320 (90%). Only a minority agreed that "policy on organ donation after cardiac death should be influenced by the results of surveys like this one": SA/A 103/320 (32%), U 103/320 (32%), and SD/D 102/320 (32%). This result is compatible with the response to the question, "you know enough about the criteria of death to judge whether the patients in the scenarios are definitely dead": for those given DI, SA/A 56 (35%), U 50 (32%), and SD/D 47 (30%); for those given BI, 56 (34%), 44 (27%), and 59 (36%), respectively (ns).

When asked "if the patient in the scenarios was not definitely dead when surgery for organ donation started, then the surgery to obtain the donated organs is what actually killed the patient. Had you thought about it this way when you answered the survey?": for those given DI, 111 (70%) responded "yes" and 38 (24%) responded "no"; for those given BI, 97 (60%) "yes" and 61 (38%) "no" ($P < 0.025$). This argument had not been suggested in the background information. When the survey stated, "considering this argument, the decision in the scenarios to donate organs 5 min after the heart stops should be allowed," 167/320 (52%) responded SA/A, 84/320 (26%) U, and 46/320 (14%) SD/D, with no significant difference between those given DI and BI. The responses to the same question previous to the given argument were as follows: SA/A 1,020/1,280 (80%), U 95/1,280 (7%), and SD/D 101/1,280 (8%) ($P < 0.001$).

Responses compared between the three groups of students

Medical students were less likely to agree the DCD patient was dead or that physicians were being truthful in

Table 4 Consistency of university student responses to scenarios describing a patient eligible for donation after cardiac death

Question and response	Detailed background information ($n = 158$)	Brief background information ($n = 162$)	P
Definitely dead: SA/A on at least one scenario	90 (57%)	103 (79%)	NS
Definitely dead: U/D/SD on at least one scenario	103 (65%)	81 (50%)	<0.01
Definitely dead: SA/A in all scenarios[a]	55/90 (61%)	81/103 (79%)	<0.01
Definitely dead: D/SD in all scenarios[a]	14/32 (44%)	7/19 (37%)	NS
DCD should be allowed: SA/A on at least one scenario	144 (91%)	148 (91%)	NS
DCD should be allowed: SA/A on all scenarios	78 (49%)	90 (56%)	NS
DCD should be allowed: U/D/SD on at least one scenario	66 (42%)	58 (36%)	NS
State of patient: Dead only for some scenarios[a]	22/59 (37%)	13/76 (17%)	<0.01
State of patient: AGAD or dead only for some scenarios[a]	25/134 (19%)	11/136 (8%)	<0.025
State of patient: alive, or not dead only for some scenarios[a]	4/7 (57%)	2/6 (33%)	NS

DCD donation after cardiac death, *SA* strongly agree, *A* agree, *U* uncertain, *D* disagree, *SD* strongly disagree, *AGAD* as good as dead

[a] For these data, the denominator is the number of participants who gave that response on at least one of the four scenarios

describing the patient as dead (Table 5). Medical students were also less likely to respond SA/A that the survey should influence policy [BI: 19 (26%) compared to others 32/89 (36%), $P < 0.01$; DI: 12 (17%) compared to others 40/89 (45%), $P < 0.025$], and less likely to respond SA/A that they are knowledgeable enough to judge criteria for death [DI: 16 (23%) compared to others 40/89 (45%), $P < 0.025$]. Nursing students given BI were more likely to respond SA/A that they were knowledgeable enough to judge criteria for death [27/38 (71%) compared to others 29/124 (23%), $P < 0.001$].

Discussion

There are several important findings from this study of university students' opinions regarding DCD. First, less than half of the respondents consider the patients in the DCD scenarios dead (≤45%), or consider the physicians truthful in describing the patients as definitely dead (≤52%). This finding was most marked for those given DI (≤30 and ≤39%, respectively). Second, respondents were often inconsistent in considering patients in the different scenarios as dead, despite their identical physiological state of absent circulation for 5 min, and this finding was most marked for those given DI. In at least one of the scenarios, 65% of those given DI and 50% of those given BI responded U/D/SD that the patient is definitely dead ($P < 0.01$). Third, many respondents (31%) had not considered the following possibility: if the patient was not dead, then organ donation is what killed the patient. After considering this possibility, only 52% of all respondents SA/A that DCD should be allowed after 5 min of absent circulation. Finally, medical students were less likely to agree that the patients in the scenarios were "dead," or

Table 5 Significant differences in medical, nursing, and philosophy students' responses to the scenarios

Question	Scenario	Detailed background information ($n = 158$)				Basic background information ($n = 162$)			
		SA/A (or the state called dead)			P	SA/A (or the state called dead)			P
		Medical ($n = 69$)	Nursing ($n = 38$)	Philosophy ($n = 51$)		Medical ($n = 73$)	Nursing ($n = 38$)	Philosophy ($n = 51$)	
The patient is definitely dead	2	24 (35%)*	25 (66%)	24 (47%)	<0.05	33 (45%)*	26 (68%)	30 (59%)	<0.05
	3	–	–	–	NS	36 (49%)*	27 (71%)	30 (59%)	<0.025
	4	–	–	–	NS	32 (44%)*	28 (74%)	29 (57%)	<0.01
The patient is in what state?	1	–	–	–	NS	23 (32%)**	23 (61%)	27 (53%)	<0.01
	2	–	–	–	NS	21 (29%)**	22 (58%)	27 (53%)	<0.01
	3	–	–	–	NS	21 (29%)**	20 (53%)	26 (51%)	<0.025
	4	–	–	–	NS	21 (29%)	22 (58%)	25 (49%)	<0.01
The physicians are being truthful	1	–	–	–	NS	27 (37%)***	25 (66%)	27 (53%)	<0.05
	2	20 (29%)*	22 (58%)	21 (41%)	<0.05	28 (38%)***	26 (68%)	28 (55%)	<0.025
	3	–	–	–	NS	28 (38%)***	27 (71%)	29 (57%)	<0.01
	4	–	–	–	NS	26 (36%)***	26 (68%)	26 (51%)	<0.025

Questions where there were no statistically significant differences in responses between the student groups are not reported in this table; * $P < 0.05$ medical students versus nurses, ** $P < 0.05$ medical students versus all others, *** $P < 0.025$ medical students versus nurses

SA strongly agree, *A* agree, *NS* not statistically significant

that the physicians were being truthful in describing the patients as dead. These results have important implications for public policy.

Previous surveys of healthcare workers and the public are not directly comparable to our survey. A semi-structured interview of 60 parents/guardians in a PICU found that 42 (70%) "agree with the DCD concept," and 52 (93%) "want to be asked about DCD if withdrawing life support on their child [22]." A recent telephone survey of 1,505 Canadian adults found that 79% thought "that the option of organ donation after DCD should be available to Canadians", and 85% were "very (42%) or somewhat (43%) comfortable with hospitals offering DCD [23]." Similarly, a Canadian survey of 720 healthcare workers found that 64% found organ donation "very acceptable after cardiocirculatory death following withdrawal of support," and 56% found organ donation "very acceptable after cardiocirculatory death following unsuccessful attempts at resuscitation [24]." Most respondents in a survey in Ontario, in which two patients were "declared dead by the doctors when their heart stopped beating," felt that "if the decision to withdraw support had been made, the patients should be allowed to donate their organs" (87–94% of healthcare workers, 81–87% of general public) [25]. These surveys did not communicate that the ethical concern of *when* to declare a person dead, with *irreversible* cessation of circulation, is central to the DCD debate. There is a significant difference between asking if organs can be donated after death, and asking when death has occurred [10–15]. A recent analysis of 60 organ procurement organizations' Internet enrollment for organ donation websites found that no consent form disclosed cardiac death criteria or organ procurement timing after cardiac death [28].

Consistent with these surveys, we found that a majority (80%) of respondents SA/A with the statement that "the decision to donate organs 5 min after the heart stops should be allowed." Yet, only 52% SA/A to this same statement when asked to consider the possibility "if the patient in the scenarios was not definitely dead when surgery for organ donation started, then the surgery to obtain the donated organs is what actually killed the patient." If a patient is not dead when organ harvest begins, some may still argue that the organ harvest is not the cause of death, since the patient would surely be dead some minutes after harvest begins (well before, for example, death from kidney failure occurs). However, we believe the surgical incisions, with removal of kidneys, attendant blood loss, and organ preservation techniques have a high risk of hastening death, and preventing any possibility of auto-resuscitation. Even in other surveys, where the debate about when a patient is dead was not raised, the 5 min time of absent circulation until death was not clearly accepted. For example, only 45% in a survey of Canadian healthcare workers [24], and only 42% in a telephone survey of Canadian adults [23] found it very acceptable to begin organ harvest after 5 min of absent circulation. Many designated requesters are not sure the DCD donor is dead [29].

Some of the background information provided for the DI group may be considered controversial (Table 1). The DI information contained the following: "from studies of a total of 108 adult patients we know that none had their heart re-start on its own after 2 min. However, several doctors have written about individual cases where a patient's heart re-started on its own 5–10 min after it could not be started with CPR in the hospital (called the 'Lazarus Phenomenon') [3, 4, 16–18, 30]." They were also given that, "to legally diagnose death, a doctor should know that the heart has stopped irreversibly. Some think this should mean that the heart cannot re-start on its own (cannot autroresuscitate). They argue that because a decision has been made to not try to re-start the heart with CPR, it is autoresuscitation that is important [1–4]. Others think irreversibility means that the heart cannot be started even if we try. For example, if we try to re-start a heart with our modern medicine and CPR, even after 10–15 min of no heartbeat often the heart can be re-started and the patient survives. They claim it does not make sense that one patient whose heart has stopped for 5 min is pronounced dead for organ donation, while another identical patient whose heart has stopped for 5 min and has CPR is not pronounced dead and survives [10–15, 31]." We believe the information is accurate, and reflects an honest interpretation of the debate concerning the ethics of DCD.

This survey indicates that, when death is defined as the irreversible absence of circulation, it is not clear that a weak construal of irreversibility is acceptable. Across the four scenarios, 103/158 (65%) given DI, and 81/162 (50%) given BI responded U/D/SD on at least one scenario when told, "at this time point, 5 min after his heart stops, this patient is definitely dead." This point has been argued by ethicists and philosophers, many of whom suggest that irreversible means "not capable of being reversed [10–15, 31, 32]." Accordingly, after 5 or 10 min of absent circulation, without the intention to intervene, the patient's *prognosis* is death, and their *physiological state* is dying. Medical students in particular were less likely to consider the patient "dead" and the physicians truthful when describing the patient as definitely dead. This may reflect their inclination to consider that medical "dogma" could be wrong.

We cannot determine whether the frequent response that DCD should be allowed was based on a decision to ignore the dead donor rule (DDR). We did not ask respondents if they agreed with the consideration that organ harvest is what kills the donor. It is possible that those who allowed DCD did not agree with this argument. Similarly, we did not ask respondents if DCD should be allowed if the donor is not dead. On each scenario (Table 3), 68–87% responded SA/A to allow DCD, and

82–93% responded SA/A/U that the patient is definitely dead, suggesting support for the DDR. On each scenario (Table E2) ≤5.1% of respondents answered both SA/A to allow DCD and D/SD that the patient is definitely dead. Furthermore, we did not present the complex ethical, religious, and legal implications of abandoning the DDR. Nevertheless, given that on each scenario 68–87% responded SA/A to allow DCD, and 42–57% responded SA/A that the patient is definitely dead, we cannot exclude that some respondents were willing to abandon the DDR; studies to clarify this are needed.

The strengths of this survey include the high response rate (100% of students attending class), and the rigorous survey development methods, including pre-testing confirmation of the clarity of the questions and possible responses. Limitations include the lack of demographic data on the respondents, absence of open-ended questions, and possible discrepancies between stated behavior and actual practice when faced with DCD clinically. As this survey targeted young adult university students in medicine, nursing, or philosophy classes, it may not be representative of other groups in the public.

We believe that these limitations do not affect our main conclusion. We found that, depending on what background information is provided and how the question is asked, there is no uniform acceptance that the DCD patient is dead, or that DCD should be allowed. In the least, this survey suggests that further debate about the concept of irreversibility as it applies to cardiocirculatory death is needed. We suggest that when asking for consent to DCD, the potential donor be informed of this debate. This is important if we are to follow the DDR [33].

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