

Clinicians' attitudes regarding withdrawal of left ventricular assist devices in patients approaching the end of life[†]

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Aims

Left ventricular assist devices (LVADs) are implanted to support the circulation of patients with advanced heart failure. Patients approaching death, or their surrogates, may request withdrawal of LVAD support. We sought to study the attitudes and practices of heart failure clinicians regarding withdrawal of LVAD support in patients approaching death.

Methods and results

Using internet-based and secure methods, we surveyed members of the European Society of Cardiology-Heart Failure Association (ESC-HFA), the International Society for Heart and Lung Transplantation (ISHLT), and the Heart Failure Society of America (HFSA) to assess their attitudes and practices regarding LVAD withdrawal for patients approaching death. The results indicated that clinicians have varied attitudes and practices regarding withdrawing LVAD support in these patients. Furthermore, ESC-HFA clinicians (primarily European) and ISHLT and HFSA clinicians (primarily North American) differed in their attitudes and practices regarding withdrawal of LVAD support, particularly its ethical and legal permissibility. For example, more European clinicians than North American clinicians regarded withdrawing LVAD support as a form of euthanasia.

Conclusion

Opinions and level of comfort with LVAD withdrawal vary among clinicians. Clinicians should be aware of suggested approaches or guidelines for managing requests for withdrawal of LVAD therapy.

Keywords

End of life • Mechanical circulatory support • Medical ethics • Palliative care • Ventricular assist device

Introduction

Left ventricular assist devices (LVADs) provide circulatory support to patients with advanced heart failure. Patients receive LVADs as a bridge to recovery and to heart transplant or as destination therapy for permanent support. Compared with medical management alone, destination therapy improves survival and quality of life for patients with severe heart failure.¹ Patients with LVADs may experience catastrophic events (e.g. stroke or haemorrhage), slow decline in overall health, or progression of another medical condition. Approximately 30% of patients receiving destination therapy die within 2 years of device implantation.² Indeed, as more LVADs are implanted, it is inevitable that clinicians will encounter end-of-life situations involving patients with these devices.

Patients approaching death, or their surrogates, may request withdrawal of LVAD support. The attitudes and practices of clinicians regarding the permissibility of withdrawing LVAD support in patients approaching death, however, are unknown. To assess these attitudes and practices, we surveyed members of several heart failure societies.

The aim of this survey was to understand the attitudes and practices of clinicians who care for patients with LVADs regarding withdrawal of LVAD support in patients approaching death.

Methods

During October and November 2011, we administered a 41-item, English language, web-based survey via electronic mail to members of the European Society of Cardiology-Heart Failure Association (ESC-HFA), the

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International Society for Heart and Lung Transplantation (ISHLT), and the Heart Failure Society of America (HFSA). (The entire survey is available online as Supplementary material.) In addition to collecting demographic data, the survey collected information pertaining to clinicians' attitudes and practices regarding withdrawal of LVAD support in patients approaching death. The survey was pilot-tested with five heart failure and palliative medicine clinicians at three different institutions.

The Mayo Clinic Survey Research Center distributed the survey to ISHLT and HFSA members directly. The ESC-HFA administrative board sent a link to the survey to its members. Survey data were collected by the Mayo Clinic Survey Research Center. Investigators were blinded to respondents' identities. Answers of 'don't know' and 'choose not to respond' were counted as missing data.

For this brief report, responses to 24 questions comprised the data set. Descriptive statistics were used. To assess potential geographical differences, ESC-HFA clinicians' responses were compared with ISHLT and HFSA ('non-ESC-HFA') clinicians' responses. Fisher's exact test was used to compare categorical data through the use of GraphPad software (GraphPad Software, Inc.). The Mayo Clinic Institutional Review Board approved this study.

Results

Respondent characteristics

The survey was distributed to the E-mail addresses of 7168 individuals. Overall, 303 (4%) individuals responded. Of the respondents, 269 (89%) were clinicians who care for patients with LVADs. Most respondents were male (65%) and cardiologists (72%). Professional society membership was as follows: ESC-HFA, 43%; ISHLT, 49%; HFSA, 22%; and > 1 of these societies, 17% (Table 1).

Attitudes and practices

Selected survey questions and responses are shown in Tables 2 and 3. Nearly half of the respondents (46%) had personally turned off an LVAD in two or more patients approaching death. Most respondents (92%) regarded LVAD support as 'life-sustaining'. Most (87%) thought 'death from the underlying disease' best described the cause of death following withdrawal of LVAD support. Some, however, viewed turning off an LVAD as different from withholding or withdrawing mechanical ventilation (29%), artificial nutrition, and hydration (40%), or vasopressor agents (25%).

About a quarter of respondents (26%) felt 'very comfortable' or 'comfortable' with personally turning off the LVAD in a patient approaching death; 17% had refused a request to turn off an LVAD in a patient approaching death; and 60% believed that a patient should be dying before LVAD support would be withdrawn. Although most believed that a psychiatric consultation (73%) or an ethics consultation (67%) should always or sometimes be obtained before carrying out a request to withdraw LVAD support, only 21% had ever requested a psychiatric consultation and 26% an ethics consultation.

Few respondents believed that LVADs should be turned off in patients who elect 'do-not-resuscitate' status (13%) or that hospice programmes should require that patients have their LVADs turned off as a condition for admission (8%). Most respondents (74%) believed that a physician should be present when an LVAD is turned off, and 65% reported that physicians are the individuals who most often turn off LVADs.

Table 1 Characteristics of survey respondents

Characteristic ^a	Respondents	
	n	%
Male sex (n = 268)	173	65
Professional membership (self-identified, n = 269)		
International Society of Heart and Lung Transplantation (ISHLT)	131	49
European Society of Cardiology-Heart Failure Association (ESC-HFA)	116	43
Heart Failure Society of America (HFSA)	59	22
> 1 of the above	46	17
No professional affiliation provided	10	4
Age, years (n = 268)		
≤ 30	13	5
31–40	86	32
41–50	78	29
51–60	70	26
≥ 61	19	7
Clinical practice type (n = 269)		
Cardiology	195	72
Cardiothoracic surgery	32	12
Critical care/intensive care	10	4
Other or no response	26	10
Academic degree (n = 269)		
MD (or equivalent)	194	72
PhD (or equivalent)	32	12
MD and PhD (or equivalent)	4	2
Other or no response	39	15
Religious affiliation (n = 269)		
Catholic	99	37
No preference	56	21
Protestant	48	18
Orthodox	22	8
Muslim	18	7
Jewish	8	3
Hindu	7	3
Other (accounting for <2% of responses) or no response	11	4

^aParentetical subsample size indicates the number of respondents answering the question.

European Society of Cardiology-Heart Failure Association clinicians vs. non-European Society of Cardiology-Heart Failure Association clinicians

The ESC-HFA clinicians were less likely than non-ESC-HFA clinicians to report ever being involved in the care of a patient nearing death who requested that an LVAD be turned off (21% vs. 58%, $P < 0.001$) and to have ever turned off an LVAD in a patient nearing death (50% vs. 82%, $P = 0.004$). ESC-HFA clinicians were more likely than non-ESC-HFA clinicians to report having refused a request to turn

Table 2 Selected survey questions that had numerical responses^a

Question	No. of respondents	Respondents, n (%)			P-value ^b
		Never	Once	More than twice	
How many times have you cared for a patient nearing death who requested their LVAD be turned off?	110				0.58
	ESC-HFA (n = 24)	0 (0)	8 (33)	16 (67)	
	Non-ESC-HFA (n = 86)	6 (7)	25 (29)	55 (64)	
How many times have you cared for a patient nearing death for whom you ordered their LVAD be turned off?	106				0.03
	ESC-HFA (n = 23)	7 (30)	10 (43)	6 (26)	
	Non-ESC-HFA (n = 83)	15 (18)	21 (25)	47 (57)	
How many times have you turned off an LVAD for a patient nearing death?	110				0.004
	ESC-HFA (n = 24)	12 (50)	5 (21)	7 (29)	
	Non-ESC-HFA (n = 86)	15 (17)	27 (31)	44 (51)	

ESC-HFA, European Society of Cardiology-Heart Failure Association; LVAD, left ventricular assist device.

^aOther questions, besides those in Tables 2 and 3, included either demographic material (as in Table 1) or free text responses. The complete survey is available as Supplementary material.

^bFrom Fisher's exact test for a 2 × 3 contingency table.

off an LVAD in a patient nearing death (50% vs. 10%, $P = 0.001$) and less likely to be 'very comfortable' or 'comfortable' with ordering that an LVAD be turned off (12% vs. 49%, $P < 0.001$) or with personally turning off an LVAD (16% vs. 41%, $P < 0.001$).

Collective concerns reported

The ESC-HFA clinicians were more likely than non-ESC-HFA clinicians to describe death after turning off an LVAD as euthanasia or physician-assisted suicide (27% vs. 4%, $P < 0.001$), to believe that requests for turning off an LVAD in patients not approaching death should never be honoured (61% vs. 30%, $P < 0.001$), to believe that a physician should be present when an LVAD is turned off (87% vs. 64%, $P = 0.001$), to report that a physician is the person who most often turns off an LVAD (83% vs. 56%, $P = 0.001$), and to perceive an intermediate or high risk of litigation for wrongful death associated with turning off an LVAD (63% vs. 21%, $P < 0.001$).

Discussion

To our knowledge, this is the first report of clinicians' attitudes and practices regarding withdrawal of LVAD support in patients approaching death. Several findings are noteworthy. Although most respondents (92%) regarded LVAD support as 'life-sustaining', a substantial minority distinguished between withdrawing LVAD support and withholding and withdrawing other life-sustaining treatments. These results are similar to those of a previous survey regarding withdrawal of implantable cardioverter-defibrillator and pacemaker support.³ Multiple reasons might account for this finding, including the perception that an LVAD has 'become part of the body' and that, in most cases, death quickly follows withdrawal of LVAD support.^{4,5}

Nonetheless, some patients, or their surrogates, may perceive that the burdens of a life-sustaining treatment outweigh its benefits and request the withdrawal of the treatment. Patients have the right to request the withdrawal of any treatment, even if death is expected quickly to follow withdrawal, and it is ethically and legally permissible to carry out such requests for informed patients.^{5,6}

Although many respondents had cared for patients with LVADs and personally turned off LVADs in patients approaching death, only a quarter of respondents felt 'very comfortable' or 'comfortable' with ordering that an LVAD be turned off or turning off an LVAD themselves in such patients. Some respondents (13%) regarded turning off an LVAD as euthanasia or physician-assisted death. These findings suggest that moral tension surrounds the management of LVADs in dying patients.

Several responses to this situation are suggested. First, clinicians who object to withdrawing LVAD support should not be compelled to do so. These clinicians should inform patients of their objections and, if necessary, transfer the patients' care to other clinicians.^{5,7} Secondly, clinicians should have low thresholds for obtaining input from psychiatric and ethics consultants (as endorsed by the respondents). However, consistent with results of a previous survey, few have actually done so.³ Finally, engaging patients and their loved ones in advance care and preparedness planning might ameliorate moral tension by determining and documenting patients' values and preferences regarding LVAD support at the end of life.^{8,9}

In general, ESC-HFA clinicians were less likely than non-ESC-HFA clinicians to endorse the permissibility of turning off LVADs in patients approaching death. These findings probably reflect geographically based cultural, ethical, legal, historical, and socio-psychological variations between the groups: most ESC-HFA clinicians practise in Europe, and most ISHLT and HFSA clinicians practise in North America.

An important limitation of this survey is the low response rate (4%). Hence, results should be interpreted with caution. For example, it is possible that clinicians who have cared for patients with LVADs approaching death were more likely to respond, resulting in self-selection bias. Although response rates to web-based surveys are often low, these surveys may nevertheless produce valid results.^{10,11}

The low response rate to our survey notwithstanding, we believe the results have important implications. First, our results should be confirmed by additional surveys with higher response rates. Secondly, as called for in recent ESC guidelines, more research is needed to

Table 3 Selected survey questions that had verbal responses^a

Question	Response	No. of respondents	No. of respondents with given response (%)			P-value ^b
			Total	ESC-HFA	Non-ESC-HFA	
Have you ever been involved in the care of a patient nearing death who requested their LVAD be turned off?	Yes	265	111 (42)	24/114 (21)	87/151 (58)	<0.001
Have you ever refused a request from a patient nearing death (or surrogate) to turn off an LVAD?	Yes	104	18 (17)	10/20 (50)	8/84 (10)	0.001
Following a request from a patient nearing death (or surrogate) to turn off an LVAD, how comfortable would you be with ordering the LVAD be turned off?	Very comfortable or comfortable	158	44 (28)	11/91 (12)	33/67 (49)	<0.001
	Other response	158	114 (72)	80/91 (88)	34/67 (51)	
Following a request from a patient nearing death (or surrogate) to turn off an LVAD, how comfortable would you be with personally turning off the LVAD?	Very comfortable or comfortable	163	43 (26)	15/95 (16)	28/68 (41)	
	Other response	163	120 (74)	80/95 (84)	40/68 (59)	<0.001
Do you consider an LVAD in a patient with advanced heart failure a life-sustaining treatment?	Yes	163	150 (92)	82/92 (89)	68/71 (96)	0.15
Do you believe a patient should be dying to turn off an LVAD?	Yes	190	114 (60)	52/77 (68)	62/113 (55)	0.097
For patients with LVADs, if they elect 'Do Not Resuscitate', does this mean their LVAD must be turned off?	Yes	240	31 (13)	24/101 (24)	7/139 (5)	<0.001
Should hospice programmes require that patients have their LVADs turned off as a condition of admission?	Yes	227	19 (8)	15/91 (16)	4/136 (3)	<0.001
If patients are admitted to a hospice with their LVAD functioning, should the hospice be responsible for turning off the LVAD in a patient nearing death?	Yes	192	59 (31)	30/82 (37)	29/110 (26)	0.16
In your opinion, should a physician be present when an LVAD is turned off in a patient nearing death?	Yes	241	178 (74)	90/104 (87)	88/137 (64)	<0.001
In your experience, who most often turns off an LVAD?	Physician	156	101 (65)	40/48 (83)	61/108 (56)	0.001
	Non-physician	156	55 (35)	8/48 (17)	47/108 (44)	
Which of the following best describes the cause of death in a patient nearing death who dies after their LVAD has been turned off?	Death from underlying disease	234	204 (87)	68/93 (73)	136/141 (96)	<0.001
	Euthanasia/physician-assisted suicide	234	30 (13)	25/93 (27)	5/141 (4)	
Do you think patients nearing death who request an LVAD be turned off should . . .						
Undergo psychiatric evaluation before the request is carried out?	Yes (always or sometimes)	248	180 (73)	82/103 (80)	98/145 (68)	0.043
Have an ethics consultation conducted before the request is carried out?	Yes (always or sometimes)	247	160 (67)	79/105 (75)	81/142 (57)	0.003
Have you ever requested a psychiatric consultation upon receiving a request to turn off an LVAD in a patient nearing death?	Yes	215	45 (21)	13/83 (16)	32/132 (24)	0.17
Have you ever requested an ethics consultation upon receiving a request to turn off an LVAD in a patient nearing death?	Yes	134	35 (26)	11/59 (19)	24/75 (32)	0.11
What is your perception of the risk of litigation for wrongful death associated with turning off an LVAD in a patient nearing death?	No risk or low risk	227	140 (62)	34/93 (37)	106/134 (79)	<0.001
	Intermediate or high risk	227	87 (38)	59/93 (63)	28/134 (21)	
Should requests for turning off an LVAD in a patient who is not nearing death ever be honoured?	Yes (always or sometimes)	190	108 (57)	31/80 (39)	77/110 (70)	<0.001
Do you see a distinction between turning off an LVAD in a patient nearing death and . . .						
Withholding or withdrawing mechanical ventilator support?	Yes	253	77 (29)	50/107 (47)	27/146 (18)	<0.001
Withholding or withdrawing intravenous fluids and/or nutrition?	Yes	240	107 (40)	48/99 (48)	59/141 (42)	0.36

Continued

Table 3 Continued

Question	Response	No. of respondents	No. of respondents with given response (%)			P-value ^b
			Total	ESC-HFA	Non-ESC-HFA	
Withholding or withdrawing intravenous vasopressors and/or inotropic agents?	Yes	244	66 (25)	34/101 (34)	32/143 (22)	0.058

ESC-HFA, European Society of Cardiology-Heart Failure Association; LVAD, left ventricular assist device.

^aOther questions, besides those in Tables 2 and 3, included either demographic material (as in Table 1) or free text responses. The complete survey is available as Supplementary material.

^bFrom Fisher's exact test for a 2 × 2 contingency table.

determine optimal end-of-life care of patients with advanced heart failure,¹² including determining the effects of advance care planning on the experiences of patients who have LVADs and are approaching death. Thirdly, possible differences in attitudes and practices between European and North American clinicians regarding end-of-life care and turning off LVADs in patients approaching death should be explored further. Finally, our findings suggest that the ESC-HFA, ISHLT, and HFSA should develop a detailed consensus statement on the management of these patients that encompasses ethical, legal, and religious principles, advance care planning, logistics of withdrawal of LVAD support, and the role of palliative care consultants, akin to a recent consensus statement regarding patients with pacemakers and implantable cardioverter-defibrillators in similar scenarios.⁷ Such guidelines should respect patients' autonomy and clinicians' consciences.

Supplementary material

Supplementary material (the complete survey tool) is available at *European Journal of Heart Failure* online.

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