

Perioperative Mechanical Circulatory Support Symposium

End-of-Life Issues in Patients With Left Ventricular Assist Devices

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Left ventricular assist devices (LVAD) can be used as either short-term (ie, bridge) or long-term (ie, destination) therapies. In the latter instance, discussion with the patient about end of life with an LVAD is necessary. Important issues at end of life for these patients range from aggressive symptom management to quality-of-life and ethical dilemmas. Multiple members of the multidisciplinary team caring for a patient with an LVAD can manage these concerns, but the support of a palliative care (PC) specialist may be particularly helpful. These PC specialists work to promote the quality of life of patients and their families facing “problems associated with life-threatening illness.”¹ Early integration of PC specialists into the care of patients with advanced disease is seen across many care models, including those for patients with advanced heart failure (HF) (Fig. 1).² Indeed, guidelines from both the Centers for Medicare & Medicaid Services (CMS) and the International Society for Heart and Lung Transplantation highlight the PC specialist as part of a comprehensive multidisciplinary team for mechanical circulatory support.^{3,4} Early involvement of a PC specialist facilitates advance care planning by encouraging meaningful discussions regarding a patient’s perception of an “unacceptable condition” that may prompt them to consider elective device

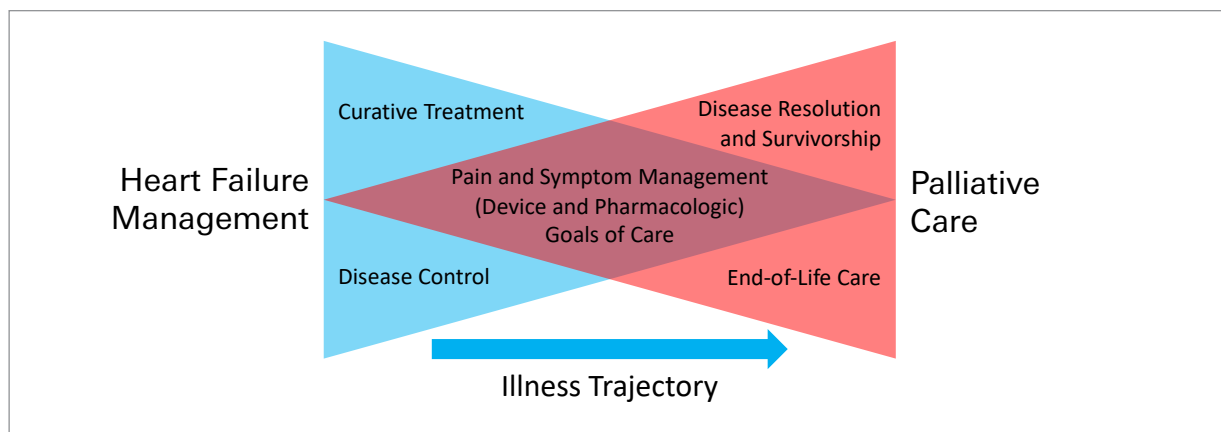


Fig. 1 Application of Hawley’s bow tie model of 21st century PC² to HF management. Because HF is a progressive condition, cardiologists and PC specialists may share the role of pain and symptom management for these patients, each offering their expertise. The role of PC specialists may increase over time, shifting from ACP to symptom management to survivorship or end-of-life care. This model also emphasizes the potential role of PC in cases of short-term LVAD use in expected cases of cure.

ACP, advance care planning; HF, heart failure; LVAD, left ventricular assist device; PC, palliative care.

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deactivation, which may be completed as a part of a CMS-mandated pre-VAD evaluation by a PC specialist.³ Completion of advance care planning reduces rates of ethics consultation, which is most commonly the result of surrogate-clinician discord about the goals of care.⁵ Patients may consider LVAD deactivation if the therapy becomes more burdensome than beneficial or if the ongoing care plan is no longer in alignment with a patient's values.⁶ Receipt of care that aligns with a patient's known values, termed *goal-concordant care*, is an indicator of high-quality care in patients who are seriously ill.⁷ High-quality communication between clinicians and patients or surrogates is key in ensuring goal-concordant care.

Any discussion about end of life in patients with an LVAD requires acknowledgment of the fundamental variation in clinician philosophy about LVAD deactivation. In all, 60% of cardiologists and 2% of PC specialists believe that death should be imminent before a patient considers LVAD deactivation.⁸ In addition, although both groups of specialists believe that the cause of death following LVAD deactivation is underlying advanced HF, 13% of cardiologist respondents considered it physician-assisted suicide. Ethically, LVAD deactivation is not assisted death; it is as ethically permissible as ventilator withdrawal at end of life, with cause of death considered to be the underlying advanced HF.⁶ Therefore, close collaboration and communication among multidisciplinary team members is needed when clinicians or patients are considering end-of-life scenarios.

Medical situations may arise in which the clinical team finds that ongoing LVAD support for a patient is unlikely to accomplish patient goals or meaningful medical improvement—a situation that may be referred to as *futility*. No fewer than 8 major positions and definitions of *futility* have been outlined, including those driven by objective clinical criteria (eg, physiologic futility) and scientific criteria (eg, quantitative futility). There has been a move away from these definitions because of their use to justify unilateral decision-making without patient or surrogate input. Options to address concerns for futile treatment include independent review and negotiation of agreement. Addressing concerns for futility should have a low threshold for the engagement of PC and ethics services.⁹

Elective long-term LVAD deactivation in an awake patient is uncommon in the authors' clinical experience and should be considered only as a last resort for otherwise-unmanageable symptoms, typically after

Abbreviations and Acronyms

CMS	Centers for Medicare & Medicaid Services
HF	heart failure
LVAD	left ventricular assist device
PC	palliative care

PC specialist consultation. Typical symptoms those with advanced HF face include pain, dyspnea, and depression.

If device deactivation in a patient with an LVAD is requested, the care team should remain in close communication with the family regarding steps in the deactivation process, particularly as a family presence during device deactivation is typical.^{10,11} This communication includes proactive discussion of device deactivation, as appropriate, along with discussion of code status and implantable cardioverter/defibrillator deactivation. Patients require pretreatment with opioids and benzodiazepines before device deactivation, much the same as with ventilator withdrawal, for the proactive minimization of pain and dyspnea. Bereaved family members most commonly report “lack of emotional preparedness for negative outcome, importance of symptom management, and surprise that device deactivation would quickly result in death.”¹² A checklist of reminders by Schaefer et al¹³ signifies the level of coordination necessary before LVAD deactivation, which involves close communication among interdisciplinary team members, family participation, and consideration of religious rites.

Survival after elective LVAD deactivation is highly variable, substantially affected by unique patient characteristics and inconsistent documentation of deactivation time in research, although time to death has been found to range from seconds to 28 hours.^{11,12,14} Most patients with a long-term LVAD die in the hospital—specifically, in the intensive care unit setting—in contrast to the general HF population. Similarly, most long-term LVAD deactivations occur in the hospital setting. Less than 15% of patients with a long-term LVAD were enrolled in hospice before death,¹⁴ a figure likely related to the unique clinical course patients with HF take compared with other high users of hospice (eg, patients with cancer or advanced dementia). Regardless, home LVAD deactivation can be accomplished through close collaboration between hospice and cardiac teams.^{10,13}

Decisions about LVAD deactivation may be more complicated than the decision made at device implantation. The PC specialist can help clarify goal-concordant care and ensure appropriate symptom management in the end-of-life period. Keeping patients central to the conversation and fostering open dialogue among clinicians, patients, and families is critical to ensuring high-quality patient care and minimizing discord throughout the end-of-life process.

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References

1. Palliative care. World Health Organization. August 5, 2020. Accessed February 1, 2023. <https://www.who.int/news-room/fact-sheets/detail/palliative-care>
2. Hawley PH. The bow tie model of 21st century palliative care. *J Pain Symptom Manage.* 2014;47(1):e2-e5. doi:10.1016/j.jpainsymman.2013.10.009
3. National Coverage Analysis decision memo: ventricular assist devices for bridge-to-transplant and destination therapy (CAG-00432R). Centers for Medicare & Medicaid Services. October 30, 2013. Accessed April 26, 2023. <https://www.cms.gov/MEDICARE-COVERAGE-DATABASE/view/ncacal-decision-memo.aspx?proposed=N&NCAId=268>
4. Feldman D, Pamboukian SV, Teuteberg JJ, et al; International Society for Heart and Lung Transplantation. The 2013 International Society for Heart and Lung Transplantation guidelines for mechanical circulatory support: executive summary. *J Heart Lung Transplant.* 2013;32(2):157-187. doi:10.1016/j.healun.2012.09.013
5. Nakagawa S, Takayama H, Takeda K, et al. Association between “unacceptable condition” expressed in palliative care consultation before left ventricular assist device implantation and care received at the end of life. *J Pain Symptom Manage.* 2020;60(5):976-983.e1. doi:10.1016/j.jpainsymman.2020.05.025
6. Mueller PS, Swetz KM, Freeman MR, et al. Ethical analysis of withdrawing ventricular assist device support. *Mayo Clinic Proc.* 2010;85(9):791-797. doi:10.4065/mcp.2010.0113
7. Modes ME, Heckbert SR, Engelberg RA, Nielsen EL, Curtis JR, Kross EK. Patient-reported receipt of goal-concordant care among seriously ill outpatients—prevalence and associated factors. *J Pain Symptom Manage.* 2020;60(4):765-773. doi:10.1016/j.jpainsymman.2020.04.026
8. McIlvennan CK, Wordingham SE, Allen LA, et al. Deactivation of left ventricular assist devices: differing perspectives of cardiology and hospice/palliative medicine clinicians. *J Card Fail.* 2017;23(9):708-712. doi:10.1016/j.cardfail.2016.12.001
9. White DM, Pope TM. Medical futility and potentially inappropriate treatment. In: Younger SJ, Arnold RM, eds. *The Oxford Handbook of Ethics at the End of Life.* Oxford University Press; 2016:65-86.
10. Panke JT, Ruiz G, Elliott T, et al. Discontinuation of a left ventricular assist device in the home hospice setting. *J Pain Symptom Manage.* 2016;52(2):313-317. doi:10.1016/j.jpainsymman.2016.02.010
11. Groninger H, Parajuli S, Stewart D, Ahmed S, Hofmeyer M, Rao A. Towards designing a better death: a retrospective analysis of planned in-hospital LVAD deactivation cases. *J Heart Lung Transplant.* 2020;39(4 suppl):S436. doi:10.1016/j.healun.2020.01.238
12. Singh M, Rao A, Kelemen A, Ahmed S, Groninger H. Eventually, every VAD gets turned off: a mixed methods analysis of in-hospital LVAD deactivations. *J Heart Lung Transplant.* 2021;40(4 suppl):S459. doi:10.1016/j.healun.2021.01.1274
13. Schaefer KG, Griffin L, Smith C, May CW, Stevenson LW. An interdisciplinary checklist for left ventricular assist device deactivation. *J Palliat Med.* 2014;17(1):4-5. doi:10.1089/jpm.2013.0450
14. Dunlay SM, Strand JJ, Wordingham SE, Stulak JM, Luckhardt AJ, Swetz KM. Dying with a left ventricular assist device as destination therapy. *Circ Heart Fail.* 2016;9(10):e003096. doi:10.1161/CIRCHEARTFAILURE.116.003096