

CHAPTER 2

NURSING CARE OF CHILDREN WITH VENTRICULAR ASSIST DEVICE

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INTRODUCTION

Mechanical circulatory support devices are the most common treatment used in severe heart failure conditions. Before the ventricular support devices were widely used, extracorporeal membrane oxygenation (ECMO) was the main method used for mechanical circulation support in pediatric patients. However, mortality and morbidity rates are high in ECMO patients ⁽¹⁾.

Ventricular support devices are used in 20% of pediatric patients with heart failure. It is generally utilized as a bridge to heart transplantation and for supporting the native heart during healing or failing process ^(2,3,4). Ventricular support devices are implanted in children with cardiomyopathy or myocarditis before organ transplantation ⁽⁵⁾. The main purpose of ventricular assist devices is to improve the quality of life beyond supporting life ⁽⁶⁾. With the introduction of ventricular assist devices, mortality rates of children on transplant waiting list were significantly reduced ^(4,7). Survival rate in children with ventriküler assist devices increased from 74% to 86 % ⁽⁸⁾. Miller et al. ⁽⁹⁾ in their study of 31 pediatric patients with ventricular assist devices revealed that 87% of the patients survived until the heart transplant and 26 out of 27 patients who had heart transplants survived at least 55-month period following the transplant. Lorts et al.¹⁰ in the study of 63 pediatric patients with ventricular assist devices, positive patient results were achieved in 71% of the patients. In this study, the most important positive results were recovery in 30.2% of patients with ventricular assist devices and bridge to transplantation in 17.5%. Ventricular assist devices can be used to support the

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CONCLUSION

In children with heart failure, ventricular assist devices support the heart in the process until organ transplantation, resulting in a reduction in mortality rates. Unlike other support devices, the ventricular assist devices improve the quality of life by allowing the child to be discharged from the hospital and exist in social settings. Healthcare professionals in many fields should work together in the placement and adaptation to the ventricular support device. Nurses play an active role in this team before and after surgery. The main objectives of nursing care are the protection of the child from complications after device placement, the adaptation to the device and the drugs to be used, the support of the child and psychosocial issues and discharge education. Nursing care increases the survival rates and well-being by enabling the child with ventricular support device to use the device successfully.

REFERENCES

1. Bryant R, Zafar F, Castleberry C, et al. Transplant survival after Berlin Heart EXCOR support. *ASAIO Journal*. 2017;63(1):80-85. doi: 10.1097/MAT.0000000000000439.
2. Sen A, Larson JS, Kashani KB, et.al. Mechanical circulatory assist devices: a primer for critical care and emergency physicians. *Critical Care*. 2016; 20: 153. doi: 10.1186/s13054-016-1328-z
3. Nichols D., Shaffner, D. H. (2015) Cardiovascular Disease. Argent, A. C., Arnold, J. H., & Yaster M. (Eds.), *Rogers' Textbook of Pediatric Intensive Care* (5nd ed., pp. 1165).China:Lippincott Williams & Wilkins.
4. Miller JR, Lancaster TS, Epstein DJ, et.al. Outcomes and Trends of Ventricular Assist Device Selection in Children with End-Stage Heart Failure. *ASAIO J*. 2017;63(4):464-469. doi: 10.1097/MAT.0000000000000506.
5. Burstein DS, Li Y, Getz KD, et.al. Mortality, Resource Utilization, and Inpatient Costs Vary Among Pediatric Heart Transplant Indications: A Merged Data Set Analysis From the United Network for Organ Sharing and Pediatric Health Information Systems Databases. *J Card Fail*. 2019;25(1):27-35. doi: 10.1016/j.cardfail.2018.11.014.
6. Mehegan M, Oldenburg G, Lantz J. Pediatric VAD discharge and outpatient care. *ASAIO Journal*. 2018;64(6): e156-e160. doi: 10.1097/MAT.0000000000000844.
7. Zafar F, Castleberry C, Khan M S, et.al. Pediatric heart transplant waiting list mortality in the era of ventricular assist devices. *J Heart Lung Transplant*. 2015;34(1):82-88. doi: 10.1016/j.healun.2014.09.018.
8. Maeda K , Rosenthal DN, Reinhartz O. Ventricular Assist Devices for Neonates and Infants. *Semin Thorac Cardiovasc Surg Pediatr Card Surg Annu*. 2018; 21:9-14. doi: 10.1053/j.pcsu.2017.11.005.
9. Miller JR, Epstein DJ, Henn MC, et.al. Early biventricular assist device use in children: a single center review of 31 patients. *ASAIO J*. 2015; 61(6): 688–694. doi:10.1097/MAT.0000000000000268.
10. Lorts A, Eghtesady P, Mehegan M, et.al. Outcomes of children supported with devices labeled as “temporary” or short term: a report from the pediatric interagency registry for mechanical circulatory support. *J Heart Lung Transplant*.2018;37(1):54-60. doi: 10.1016/j.healun.2017.10.023.
11. Mascio CE. The use of ventricular assist device support in children: the state of the art. *Artif Organs*.2015;39(1):14-20. doi:10.1111/aor.12439.

12. van Manen MA. The ventricular assist device in the life of the child: a phenomenological pediatric study. *Qual Health Res.* 2017; 27(6): 792–804. doi: 10.1177/1049732317700853.
13. Das BB. Current state of pediatric heart failure. *Children (Basel).* 2018; 5(7): 88. doi: 10.3390/children5070088.
14. Petruik C, Mack C, Conway J, et. al. Talking with caregivers of children living in the community with ventricular assist devices. *Pediatric Transplantation.* 2017;21(7). doi: 10.1111/petr.13049
15. Tume SC, Conway J, Ryan KR, et.al. Developments in pediatric ventricular assist device support. *World Journal for Pediatric and Congenital Heart Surgery.*2019:1-10. doi:10.1177/2150135119880890
16. Eisen JH. Left ventricular assist devices (lvads): history, clinical application and complications. *Korean Circ J.* 2019;49(7):568-585. doi: 10.4070/kcj.2019.0161.
17. Hetzer R, del Maria Javier MF, Delmo Walter EM. Role of paediatric assist device in bridge to transplant. *Ann Cardiothorac Surg* 2018;7(1):82-98. doi:10.21037/acs.2018.01.03.
18. Conway J, VanderPluym C, Jeewa A, et.al. Now how do we get them home? outpatient care of pediatric patients on mechanical circulatory support. *Pediatr Transplant.* 2016;20(2):194-202. doi: 10.1111/petr.12674.
19. Shin YR, Park YH, Park HK. Pediatric Ventricular Assist Device. *Korean Circ J.* 2019;49(8):678-690. doi:10.4070/kcj.2019.0163.
20. Öztürk P, Tuncer ON. Continuous flow ventricular assist device implantation in pediatrics: Single center experience. *Ege Journal of Medicine.* 2019;58(1):52-54. doi:10.19161/ETD.418041.
21. Shin JH, Park HK, Jung SY. The first pediatric heart transplantation bridged by a durable left ventricular assist device in Korea. *Korean J Thorac Cardiovasc Surg.* 2020;53(2): 79-81. doi:10.5090/kjtc.2020.53.2.79.
22. Auerbach, SR, Richmond ME, Schumacher KR, et.al. Infectious complications of ventricular assist device use in children in the US: Data from the Pediatric Interagency Registry for Mechanical Circulatory Support (Pedimacs). *J Heart Lung Transplant.* 2018; 37(1): 46–53. doi: 10.1016/j.healun.2017.09.013.
23. Gravino R, Limongelli G, Petraio A, et.al. Berlin Heart EXCOR® pediatric ventricular assist device in a patient with Sotos syndrome: A case report. *Journal of Medical Case Reports.* 2019; 13:286. doi: 10.1186/s13256-019-2190-9.
24. Chen S, Lin A, Liu E, et.al. Outpatient outcomes of pediatric patients with left ventricular assist devices. *ASAIO J.* 2016;62(2):163-8. doi: 10.1097/MAT.0000000000000324.
25. Özdemir Köken Z, Sezer RE, Kervan Ü. Caring for patients with ventricular assist devices: A mini-review of the literature. *Transplant Proc.* 2019;51(7):2492-2494. doi: 10.1016/j.transproceed.2019.03.046.
26. Machado RC, Gironés P, Rodrigues de Souza A, et.al. Nursing care protocol for patients with a ventricular assist device. *Rev Bras Enferm.* 2017;70(2):335-341. doi: 10.1590/0034-7167-2016-0363.
27. Starrh L, Becker D. Ventricular assist devices: the basics. *The Journal for Nurse Practitioners.*2018;14(7): 538-544. doi: 10.1016/j.nurpra.2018.05.001.
28. Chmielinski A, Koons B. Nursing care for the patient with a left ventricular assist device. *Nursing.* 2017;47(5):34-40. doi: 10.1097/01.NURSE.0000515503.80037.07.
29. Özdemir Z, Şenol Çelik S. Wound care of the driveline exit site in patients with a ventricular assist device: A systematic review. *Turkish Journal of Thoracic and Cardiovascular Surgery* 2018;26(2):328-335. doi: 10.5606/tgkdc.dergisi.2018.14982.
30. International Transplant Nurses Society. (2017). Mechanical Circulatory Support. Cupples S., Lerret S., McCalmont & Ohler L. (Eds.), *Transplant Nurses* (2nd ed., pp. 413–450).
31. Cestari VRF, de Paula Pessoa VLM, Moreira TMM, et.al. Ventricular assist devices and nursing care. *Texto Contexto Enferm,* 2017; 26(3):1-12. doi: 10.1590/010407072017000980016.