Clinical Policy: Pediatric Heart Transplant

Reference Number: CP.MP.138
Date of Last Revision: 12/22

Coding Implications
Revision Log

See Important Reminder at the end of this policy for important regulatory and legal information.

Description

Pediatric heart disease may be a progressive disease, affecting cardiac structure and function in infants and children. Heart transplantation is the treatment of choice for pediatric patients with end-stage heart disease. This policy establishes the medical necessity requirements for pediatric heart transplants and re-transplants.

Policy/Criteria

I. It is the policy of health plans affiliated with Centene Corporation® that heart transplant for pediatric members/enrollees (age < 18) with end-stage heart disease is **medically necessary** when all of the following conditions are met:

A. End-stage heart disease due to any of the following indications[1]:

1. *For heart transplantation, one of the following:*
   a. Stage D heart failure (see table 1) associated with systemic ventricular dysfunction with cardiomyopathies or previously repaired/palliated congenital heart disease (CHD);
   b. Stage C heart failure associated with any of the following:
      i. Severe limitation of exercise and activity, evidenced by peak maximum oxygen consumption < 50% predicted for age and sex;
      ii. Systemic ventricular dysfunction in patients with cardiomyopathies or previously repaired/palliated CHD when heart failure is associated with significant growth failure attributable to the heart disease;
      iii. Near sudden death, and/or life-threatening arrhythmias untreatable with medications or an implantable defibrillator;
      iv. Restrictive cardiomyopathy disease associated with reactive pulmonary hypertension;
      v. Reactive pulmonary hypertension and a potential risk of developing fixed, irreversible elevation of pulmonary vascular resistance that could preclude orthotopic heart transplantation in the future;
      vi. Certain anatomic and physiological conditions likely to worsen the natural history of previously repaired or palliated CHD that may lead to consideration for heart transplantation without severe systemic ventricular dysfunction, including any of the following:
         a) Severe aortic or systemic AV valve insufficiency that is not considered amenable to surgical correction;
         b) Severe arterial oxygen desaturation (cyanosis) that is not considered amenable to surgical correction;
         c) Persistent protein-losing enteropathy despite optimal medical/surgical therapy;

c. Certain anatomic and physiological conditions likely to worsen the natural history of CHD in infant patients with a functional single ventricle, which can lead to use of heart transplantation as primary therapy, including any of the following:
   i. Severe stenosis (stenoses) or atresia in proximal coronary arteries;
   ii. Moderate to severe stenosis and/or insufficiency of the atrioventricular (AV) and/or systemic semilunar valve(s);
   iii. Severe ventricular dysfunction;

2. *For heart re-transplantation*, moderate to severe cardiac graft vasculopathy;

B. Life expectancy in the absence of cardiopulmonary disease ≥ 2 years;
C. All reversible causes of heart failure have been ruled out such as, but not limited to, anemia, hypertension, renal failure, acidosis, obesity, malnutrition, respiratory disorders and thyroid disorders;
D. Does not have any of the following contraindications:
1. Glomerular filtration rate < 40 mL/min/1.73m2 unless being considered for multi-organ transplant;
2. HIV infection with detectable viral load;
3. Severe, irreversible, fixed elevation of pulmonary vascular resistance;
4. Severe hypoplasia of the central branch pulmonary arteries or pulmonary veins;
5. Any specific congenital heart lesion, except in circumstances noted in I.A.;
6. Amyloid light-chain (AL) amyloidosis (exceptions may be made where curative therapy of amyloidosis has been performed or is planned, such as with stem cell transplantation in primary amyloidosis, or with liver transplantation in familial amyloidosis);
7. Retransplantation when performed during an episode of ongoing, acute allograft rejection, even in the presence of graft vasculopathy;
8. Retransplantation when performed during the first 6 months after primary transplantation;
9. Malignancy with high risk of recurrence or death related to cancer;
10. Acute liver failure, or cirrhosis with portal hypertension or synthetic dysfunction unless being considered for multi-organ transplant;
11. Acute renal failure with rising creatinine or on dialysis and low likelihood of recovery;
12. Other severe uncontrolled medical condition expected to limit survival after transplant;
13. Uncorrected atherosclerotic disease with suspected or confirmed end-organ ischemia or dysfunction;
14. Chronic infection with highly virulent and/or resistant microbes that are poorly controlled pre-transplant;
15. Active *tuberculosis* infection;
16. Progressive cognitive impairment;
17. Significant chest wall/spinal deformity expected to cause severe restriction after transplantation;
18. BMI ≥ 35 or BMI ≥ 120% of the 95th percentile (varies by sex and age), whichever is lower.; see https://www.cdc.gov/growthcharts/clinical_charts.htm for BMI percentile by age, and refer to Appendix A for 120% of the 95th percentile values);

19. Inability to adhere to the regimen necessary to preserve the transplant, even with caregiver support;
20. Absence of an adequate or reliable social support system;
21. Active substance use or dependence including current tobacco use, vaping, marijuana smoking, or IV drug use without convincing evidence of risk reduction behaviors, such as meaningful and/or long-term participation in therapy for substance abuse and/or dependence. Serial blood and urine testing may be used to verify abstinence from substances that are of concern.

Appendix A:
Steps to determine 120% of 95th BMI percentile by age:

1. Calculate BMI by age, with percentile, here: https://www.cdc.gov/healthyweight/bmi/calculator.html
2. In the row corresponding to the child's age, look at the last column of the chart corresponding to BMI for those with a male or female reproductive system to determine if the child's BMI falls at or above 120% of the 95th percentile BMI value.

BMI for those with a male reproductive system		
Age in years	**95th percentile BMI***	**BMI 120% of 95th percentile**
2 < 2.5	19.3 to 18.7	23.2 to 22.4
2.5 < 3	18.7 to 18.2	22.4 to 21.8
3 < 3.5	18.2 to 18.0	21.8 to 21.6
3.5 < 4	18.0 to 17.8	21.6 to 21.4
4 < 4.5	17.8	21.4
4.5 < 5	17.8 to 17.9	21.4 to 21.5
5 < 5.5	17.9 to 18.1	21.5 to 21.7
5.5 < 6	18.1 to 18.4	21.7 to 22.1
6 < 6.5	18.4 to 18.8	22.1 to 22.6
6.5 < 7	18.8 to 19.2	22.6 to 23.0
7 < 7.5	19.2 to 19.6	23.0 to 23.5
7.5 < 8	19.6 to 20.1	23.5 to 24.1
8 < 8.5	20.1 to 20.6	24.1 to 24.7
8.5 < 9	20.6 to 21.1	24.7 to 25.3
9 < 9.5	21.1 to 21.6	25.3 to 25.9
9.5 < 10	21.6 to 22.2	25.9 to 26.6
10 < 10.5	22.2 to 22.7	26.6 to 27.2
10.5 < 11	22.7 to 23.2	27.2 to 27.8
11 < 11.5	23.2 to 23.7	27.8 to 28.4
11.5 < 12	23.7 to 24.2	28.4 to 29.0
12 < 12.5	24.2 to 24.7	29.0 to 29.6
12.5 < 13	24.7 to 25.2	29.6 to 30.2
13 < 13.5	25.2 to 25.6	30.2 to 30.7

BMI for those with a female reproductive system		
Age in years	**95th percentile BMI***	**BMI 120% of 95th percentile**
2- < 2.5	19.1 to 18.6	22.9 to 22.3
2.5- < 3	18.6 to 18.3	22.3 to 22.0
3- < 3.5	18.3 to 18.1	22.0 to 21.7
3.5- < 4	18.1 to 18.0	21.7 to 21.6
4- < 4.5	18.0 to 18.1	21.6 to 21.7
4.5- < 5	18.1 to 18.2	21.7 to 21.8
5- < 5.5	18.2 to 18.5	21.8 to 22.2
5.5- < 6	18.5 to 18.8	22.2 to 22.6
6- < 6.5	18.8 to 19.2	22.6 to 23.0
6.5- < 7	19.2 to 19.6	23.0 to 23.5
7- < 7.5	19.6 to 20.1	23.5 to 24.1
7.5 < 8	20.1 to 20.7	24.1 to 24.8
8 < 8.5	20.7 to 21.2	24.8 to 25.4
8.5 < 9	21.2 to 21.8	25.4 to 26.2
9 < 9.5	21.8 to 22.4	26.2 to 26.9
9.5 < 10	22.4 to 23.0	26.9 to 27.6
10 < 10.5	23.0 to 23.6	27.6 to 28.3
10.5 < 11	23.6 to 24.1	28.3 to 28.9
11 < 11.5	24.1 to 24.7	28.9 to 29.6
11.5 < 12	24.7 to 25.2	29.6 to 30.2
12 < 12.5	25.2 to 25.8	20.2 to 31.0
12.5 < 13	25.8 to 26.3	31.0 to 31.6
13 < 13.5	26.3 to 26.8	31.6 to 32.2

Age in years	95th percentile BMI*	BMI 120% of 95th percentile
13.5 < 14	25.6 to 26.0	30.7 to 31.2
14 < 14.5	26.0 to 26.4	31.2 to 31.7
14.5 < 15	26.4 to 26.8	31.7 to 32.2
15 < 15.5	26.8 to 27.2	32.2 to 32.6
15.5 < 16	27.2 to 27.6	32.6 to 33.1
16 < 16.5	27.6 to 27.9	33.1 to 33.5
16.5 < 17	27.9 to 28.2	33.5 to 33.8
17 < 17.5	28.2 to 28.6	33.8 to 34.3
17.5 < 18	28.6 to 29.0	34.3 to 34.8
18 < 18.5	29.0 to 29.4	34.8 to 35.3
18.5 < 19	29.4 to 29.7	35.3 to 35.6
19 < 19.5	29.7 to 30.1	35.6 to 36.1
19.5 < 20	30.1 to 30.6	36.1 to 36.7

Age in years	95th percentile BMI*	BMI 120% of 95th percentile
13.5 < 14	26.8 to 27.3	32.2 to 32.8
14 < 14.5	27.3 to 27.8	32.8 to 33.4
14.5 < 15	27.8 to 28.2	33.4 to 33.8
15 < 15.5	28.2 to 28.5	33.8 to 34.2
15.5 < 16	28.5 to 28.9	34.2 to 34.7
16 < 16.5	28.9 to 29.3	34.7 to 35.2
16.5 < 17	29.3 to 29.6	35.2 to 35.5
17 < 17.5	29.6 to 29.9	35.5 to 35.9
17.5 < 18	29.9 to 30.3	35.9 to 36.4
18 < 18.5	30.3 to 30.6	36.4 to 36.7
18.5 < 19	30.6 to 31.0	36.7 to 37.2
19 < 19.5	31.0 to 31.4	37.2 to 37.7
19.5 < 20	31.4 to 31.8	37.7 to 38.2

Background

Pediatric heart disease incorporates a wide range of diseases and includes a variety of age ranges. Heart transplantation is recommended for end-stage pediatric heart disease. Cardiomyopathy is the most common indication for heart transplant in children and dilated cardiomyopathy is the most common form of cardiomyopathy in the pediatric population, followed by hypertrophic and restrictive diseases.[1]

The American Heart Association has published a scientific statement specifically to address the requirements for heart transplantation and re-transplantations in pediatric heart disease.[1] Canter, *et al,* addresses the indications for heart transplants and defines the staging of heart failure as illustrated in Table 1.

The current survival rates in pediatric recipients 1, 5, and 10 years after transplantation is approximately 90, 80, and 60%, respectively.[2] The median survival is 19.7 years for infants, 16.8 years for children ages 1-5, 14.5 years for children ages 6-10, and 12.4 years for children ages 11-17 at the time of trasnplanation.[3] Several risk factors contribute to the decreasing survival in older ages groups, including immature immune system in infants, the absence of preformed antibodies in infants, sensitization in the older children due to surgical repair for congenital heart disease, and medication non-compliance in older children.[3]

Dipchand, *et al,* analyzed the Registry of the International Society for Heart and Lung Transplantation and reported the proportion of transplant recipients by age accordingly: 24% infants, 25% aged between 1 and 5 years, 16% aged between 6 and 10 years, and 35% aged between 11 and 17 years.[5]

Table 1: Heart Failure Stages in Pediatric Heart Disease

Classification	Characteristics
A	At high risk for developing heart failure
B	Abnormal cardiac structure and/or function; no symptoms of heart failure
C	Abnormal cardiac structure and/or function; past or present symptoms of heart failure
D	Abnormal structure and/or function; continuous infusion of intravenous inotropes or prostaglandin E_1 to maintain patency of a ductus arteriosus; mechanical ventilatory and/or mechanical circulatory support

Coding Implications

This clinical policy references Current Procedural Terminology (CPT®). CPT® is a registered trademark of the American Medical Association. All CPT codes and descriptions are copyrighted 2020, American Medical Association. All rights reserved. CPT codes and CPT descriptions are from the current manuals and those included herein are not intended to be all-inclusive and are included for informational purposes only. Codes referenced in this clinical policy are for informational purposes only. Inclusion or exclusion of any codes does not guarantee coverage. Providers should reference the most up-to-date sources of professional coding guidance prior to the submission of claims for reimbursement of covered services.

CPT® Codes	Description
33944	Backbench standard preparation of cadaver donor heart allograft prior to transplantation, including dissection of allograft from surrounding soft tissues to prepare aorta, superior vena cava, inferior vena cava, pulmonary artery, and left atrium for implantation
33945	Heart transplant, with or without recipient cardiectomy

Reviews, Revisions, and Approvals	Revision Date	Approval Date
New policy developed, specialist reviewed	12/16	01/17
Added AL amyloidosis as a contraindication.	01/18	01/18
Specified for each indication the stage of heart failure required, and removed general criteria stating that patient is in stage C or D heart failure. Removed "severely limited functional status with poor rehab potential," as it is included in criteria requiring "adequate functional status with the ability for rehabilitation."	05/18	
References reviewed and updated.	01/19	01/19
Code I25.1 changed to I25.10. In D.15, replaced "Class II or III obesity (body mass index ≥35.0 kg/m$^{2)}$ with BMI ≥120% of the 95th percentile and added a link to the CDC clinical growth Charts. Added Appendix A with the 95th percentile values. Specialist reviewed.	01/20	01/20

Reviews, Revisions, and Approvals	Revision Date	Approval Date
Edited malignancy contraindication to not specify within 2 years, and added exceptions of cancer that has been completely resected, or that has been treated and poses acceptable future risk. Removed coronary artery disease not amenable to revascularization from list of contraindications.	05/20	05/20
Reformatted criteria to group all class C heart failure scenarios together and added additional exclusion of ruling out reversible causes of heart failure. References reviewed and updated. Replaced "member" with "member/enrollee" in all instances.	12/20	12/20
In I.C., replaced "adequate functional status with ability for rehabilitation" and contraindications regarding past or current nonadherence to medical therapy, and psychological condition associated with the inability to comply with medical therapy with "Inability to adhere to the regimen necessary to preserve the transplant, even with caregiver support." Changed "review date" in header to "Date of Last Revision" and "Date" in the revision log header to "Revision Date."	08/21	08/21
Annual review. Revised I.C.13, from "BMI ≥ 120% of the 95th percentile (varies by sex and age)" to "BMI ≥ 35 or BMI ≥ 120% of the 95th percentile (varies by sex and age), whichever is lower." References reviewed and updated. Reviewed by specialist.	12/21	12/21
Moved criterion "all reversible causes of heart failure have been ruled out…" to I.C, and moved contraindications to I.D. Edited contraindications: added GFR rate; added "Acute liver failure or cirrhosis…", added acute renal failure; added HIV infection with detectable viral load; added septic shock; added progressive cognitive impairment; replaced "untreatable significant dysfunction of another major organ system.." with "Other severe uncontrolled medical condition expected to limit survival after transplant"; slightly reworded substance use contraindication; removed "acute medical instability…" and "uncorrectable bleeding diathesis;" replaced "malignancy, except for non-melanoma…" with "Malignancy with high risk of recurrence or death related to cancer."	02/22	02/22
Changed description and header of BMI charts from mentioning "male" and "female" to "those with a male reproductive system" and "those with a female reproductive system."	09/22	
Annual review. Appendix A tables updated to remove dashes. Removed ICD-10 codes. References reviewed and reformatted.	12/22	

References

1. Canter CE, Shaddy RE, Bernstein D, et al. Indications for heart transplantation in pediatric heart disease: a scientific statement from the American Heart Association Council on Cardiovascular Disease in the Young; the Councils on Clinical Cardiology, Cardiovascular Nursing, and Cardiovascular Surgery and Anesthesia; and the Quality of Care and Outcomes Research Interdisciplinary Working Group [published correction appears in Circulation. 2007

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Important Reminder

This clinical policy has been developed by appropriately experienced and licensed health care professionals based on a review and consideration of currently available generally accepted standards of medical practice; peer-reviewed medical literature; government agency/program approval status; evidence-based guidelines and positions of leading national health professional organizations; views of physicians practicing in relevant clinical areas affected by this clinical policy; and other available clinical information. The Health Plan makes no representations and accepts no liability with respect to the content of any external information used or relied upon in developing this clinical policy. This clinical policy is consistent with standards of medical practice current at the time that this clinical policy was approved. "Health Plan" means a health plan that has adopted this clinical policy and that is operated or administered, in whole or in part, by Centene Management Company, LLC, or any of such health plan's affiliates, as applicable.

The purpose of this clinical policy is to provide a guide to medical necessity, which is a component of the guidelines used to assist in making coverage decisions and administering benefits. It does not constitute a contract or guarantee regarding payment or results. Coverage decisions and the administration of benefits are subject to all terms, conditions, exclusions and limitations of the coverage documents (e.g., evidence of coverage, certificate of coverage, policy, contract of insurance, etc.), as well as to state and federal requirements and applicable Health Plan-level administrative policies and procedures.

This clinical policy is effective as of the date determined by the Health Plan. The date of posting may not be the effective date of this clinical policy. This clinical policy may be subject to applicable legal and regulatory requirements relating to provider notification. If there is a discrepancy between the effective date of this clinical policy and any applicable legal or regulatory requirement, the requirements of law and regulation shall govern. The Health Plan retains the right to change, amend or withdraw this clinical policy, and additional clinical policies may be developed and adopted as needed, at any time.

This clinical policy does not constitute medical advice, medical treatment or medical care. It is not intended to dictate to providers how to practice medicine. Providers are expected to exercise professional medical judgment in providing the most appropriate care, and are solely responsible for the medical advice and treatment of members/enrollees. This clinical policy is not intended to recommend treatment for members/enrollees. Members/enrollees should consult with their treating physician in connection with diagnosis and treatment decisions.

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Note: For Medicaid members/enrollees, when state Medicaid coverage provisions conflict with the coverage provisions in this clinical policy, state Medicaid coverage provisions take precedence. Please refer to the state Medicaid manual for any coverage provisions pertaining to this clinical policy.

Note: For Medicare members/enrollees, to ensure consistency with the Medicare National Coverage Determinations (NCD) and Local Coverage Determinations (LCD), all applicable NCDs, LCDs, and Medicare Coverage Articles should be reviewed prior to applying the criteria set forth in this clinical policy. Refer to the CMS website at http://www.cms.gov for additional information.