

*Guidance Document for Public Comment*

# Guidance Addressing the Use of Pediatric Heart Exceptions

*OPTN Heart Transplantation Committee*

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# Guidance Addressing the Use of Pediatric Heart Exceptions

*Sponsoring Committee:* Heart Transplantation  
*Public Comment Period:* August 4, 2020 – October 1, 2020

## Executive Summary

In June 2020, the Organ Procurement and Transplantation Network (OPTN) Board of Directors (the Board) approved creation of a National Heart Review Board (NHRB) for Pediatrics.<sup>1</sup> Members of the former OPTN Thoracic Organ Transplantation Committee and the Pediatric Transplantation Committee developed the NHRB for Pediatrics proposal during 2019 and 2020. The members had formed a Pediatric Heart Workgroup (hereafter, the Workgroup) to address concerns about the use of pediatric heart exception requests following allocation policy changes implemented in March 2016<sup>2</sup>. Workgroup members were also concerned about the lack of pediatric heart expertise on the regional review boards as well as the regional differences associated with the approval of pediatric heart exception requests. Following the dissolution of the OPTN Thoracic Organ Transplantation Committee<sup>3</sup>, the newly formed OPTN Heart Transplantation (hereafter, the Committee) will sponsor the NHRB.

The Workgroup vested authority for determining pediatric exception requests within a single entity comprised of individuals with specific pediatric heart transplantation expertise. Following implementation of the NHRB, each pediatric Status 1A and 1B exception request will be randomly assigned to a group of specialists in pediatric heart transplant from across the country. NHRB members assigned to a request will decide whether to approve it based on the information provided by the requesting transplant program.

While working on the NHRB for Pediatrics proposal, the Workgroup agreed to also develop a guidance document for assisting future NHRB members with their exception request determination. To improve what clinical information is submitted for members to review, the document also provides guidance for the transplant programs responsible for drafting the requests. The Workgroup determined a guidance document was more appropriate than policy changes since exceptions arise because the candidate's condition cannot be easily aligned with the criteria established in policy. A guidance document allows reviewers to consider the specific clinical circumstances of each candidate on a case by case basis to determine whether the exception criteria set forth by OPTN Policy are met. Similar guidance documents that further define clinical criteria to assist with the review of exception requests are implemented for other organ review boards such as the National Liver Review Board.

The Committee is seeking public feedback on the proposed guidance, including the following:

- Are there other contraindications to the use of a Ventricular Assist Device (VAD) that should be considered?

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<sup>1</sup> OPTN Board of Directors meeting, June 8, 2020.

<sup>2</sup> This proposal is available at <https://optn.transplant.hrsa.gov/professional-education/pediatric-heart-allocation/>

<sup>3</sup> Effective 7/1/2020, the OPTN Thoracic Committee dissolved and was replaced with the OPTN Lung Transplantation Committee and the OPTN Heart Transplantation Committee which will continue to sponsor the NHRB for Pediatrics project. <https://optn.transplant.hrsa.gov/media/3721/thoracic-split-policy-notice-march-2020.pdf>

- What, if any, measure of sensitization could be included to assist in determining whether a Coronary Allograft Vasculopathy candidate should be considered for Status 1A listing by exception?

## Background

The National Organ Transplantation Act of 1984 (NOTA), as amended, provides special status to pediatric transplant candidates. Under NOTA, the OPTN is required to “adopt criteria, policies, and procedures that address the unique health care needs of children” under the age of 18.<sup>4</sup> As part of its ongoing commitment to this population, the Board approved changes to pediatric heart allocation policy that were implemented in 2016. The Board’s primary goal was improving waiting list mortality rates for pediatric candidates. The Board sought to achieve this, in part, by redefining the criteria associated with pediatric heart Statuses 1A and 1B to ensure that candidates of comparable levels of medical urgency are in the same statuses.

However, initial findings suggested little change in waiting list mortality rates. In October 2017, members of both the Thoracic and Pediatric committees reviewed a monitoring report analyzing the first 12 months after implementation of the new policy.<sup>5</sup> According to a subsequent report, analysis of the first 12 months of data following implementation found that pediatric death rates on the heart waiting list did not change after policy implementation.<sup>6</sup> At the time, Committee members noted a marked increase in the use of exceptions to justify placing candidates in Status 1A, particularly among those diagnosed with cardiomyopathy.<sup>7</sup> A result of the policy modifications was that candidates diagnosed with cardiomyopathy were less likely to be placed in Status 1A based on the new criteria. Evaluation of the monitoring data also revealed that the candidates being listed at Status 1A by exception following implementation saw an increase in their access to transplantation, which was not found among other diagnoses.<sup>8</sup>

The Workgroup members considered these findings and other information during their 2019 and 2020 work on the NHRB for Pediatrics. Based on the information, the Workgroup also identified the need to clarify the use of exception requests for pediatric heart Status 1A candidates. They also decided that a guidance document, similar to guidance created for the National Liver Review Board, was a more appropriate tool than a policy change because exceptions fall outside of established policy by their nature, and involve the discretion of those submitting and reviewing them. A guidance document also allows them to clarify the intent of existing policy, without rising to the level of an OPTN Obligation.

It was determined to include the following categories for the reasons below in the guidance document.

- Dilated Cardiomyopathy
  - A higher proportion of transplant recipients diagnosed with cardiomyopathy were in Status 1A by exception after implementation of the new policy (see **Figure 1**)
  - Waiting list mortality for candidates with cardiomyopathy in Status 1A was not statistically different from that of candidates in Status 1B before and after policy implementation<sup>9</sup>
  - Candidates waiting in Status 1A had significantly higher transplant rates than those in Status 1B<sup>10</sup>

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<sup>4</sup> 42 USC §274(b)(2)(M), (O).

<sup>5</sup> OPTN, *Final Report: Changes to Pediatric Heart Allocation Policy Evaluation*, October 12, 2017.

<sup>6</sup> OPTN, *Final Report: Changes to Pediatric Heart Allocation Policy Evaluation*, April 9, 2018.

<sup>7</sup> IBID.

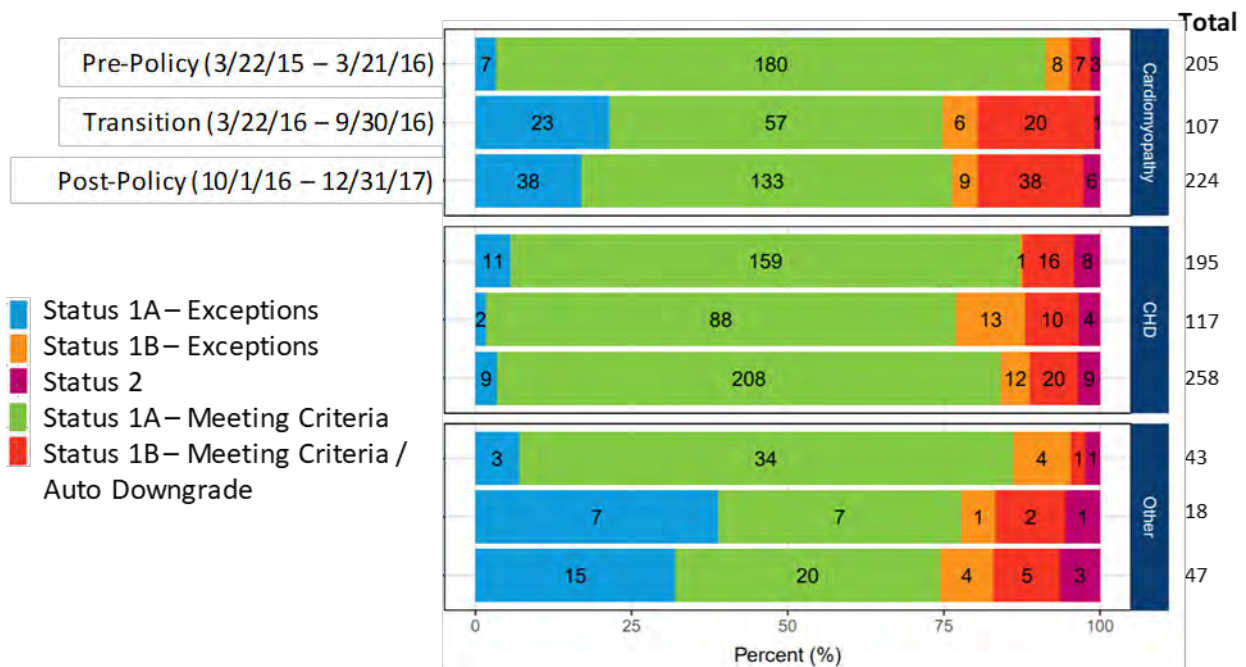
<sup>8</sup> IBID.

<sup>9</sup> IBID.

<sup>10</sup> IBID.

- Hypertrophic or restrictive cardiomyopathy
  - Candidates had higher waiting list mortality when qualifying under standard criteria and not an exception
  - Inotrope use as a qualifying criteria for Status 1A was eliminated in 2016 policy changes potentially increasing exceptions for candidates who likely would have qualified under this criteria previously
- Coronary allograft vasculopathy (CAV) and retransplants
  - Candidates do not have any particular prioritization under the current allocation system
  - 63% of retransplants are due to CAV<sup>11</sup>
  - 6.6% higher waiting list mortality than primary heart transplant candidates<sup>12</sup>
- Single ventricle congenital heart disease
  - Inconsistency with adult status for certain single ventricle candidates resulting in the potential for the same patient to be in a lower listing status as a pediatric candidate than if they were listed as an adult

Figure 1: Pediatric Heart Transplants by Exception Status, Era and Diagnosis<sup>13</sup>



<sup>11</sup> Bock, Matthew J., Khanh Nguyen, Stefano Malerba, Kimberly Harrison, Emilia Bagiella, Bruce D. Gelb, Sean P. Pinney, and Irene D. Lytrivi. "Pediatric cardiac retransplantation: Waitlist mortality stratified by age and era." *The Journal of Heart and Lung Transplantation* 34, no. 4 (2015): 530-537.

<sup>12</sup> IBID.

<sup>13</sup> OPTN, *Briefing Paper, National Heart Review Board for Pediatrics*, June 2020, p. 4. Accessed 07/08/2020. [https://optn.transplant.hrsa.gov/media/3808/202006\\_thoracic\\_natl\\_heart\\_reviewboard\\_for\\_peds\\_bp.pdf](https://optn.transplant.hrsa.gov/media/3808/202006_thoracic_natl_heart_reviewboard_for_peds_bp.pdf)

## Purpose

The purpose of this proposal is to create a guidance document for the NHRB for Pediatric Candidates. The guidance document was drafted with the goal of increasing equal access to candidates with comparable medical urgency by helping the members of the NHRB for Pediatrics standardize decision-making when reviewing exception requests for certain Status 1A and Status 1B candidates. This guidance document does not create or change OPTN policy

The document provides guidance on the following pediatric heart diagnoses:

- Dilated cardiomyopathy
- Hypertrophic or restrictive cardiomyopathy
- Single ventricle heart disease
- Coronary allograft vasculopathy and transplantation

## Recommendations

The following sections provide information about how the proposed guidance was developed, and includes justifications for the guidance itself.

### Dilated Cardiomyopathy (DCM)

DCM candidates generally have had lower waiting list mortality after the 2016 changes, regardless whether they had a Status 1A exception or not.<sup>14</sup> DCM candidates had a higher frequency of using exceptions than HCM/RCM candidates.<sup>15</sup> Accordingly, the intent by including this population in the guidance is to limit the use of exceptions among DCM candidates to those who are at particularly high risk based on clinical conditions in order to maximize the number of candidates who get a transplant within an appropriate amount of time.<sup>16</sup> This includes candidates under five kilograms (kg) in weight who carry a higher risk for use of mechanical support, as well as candidates that weigh between five and ten kilograms and likely carry a similar risk.<sup>17</sup>

#### *Candidates under 5 kg and under 10 kg*

The intent of the criteria is to avoid situations in which a candidate is given a ventricular assist device (VAD) just to achieve a higher status for transplant. The proposed guidance states that candidates under 5 kg should be considered for a Status 1A exception if they are on at least one high-dose inotrope. Candidates under 10 kg may be eligible for a Status 1A exception if they are supported by inotropes and demonstrate some evidence of poor systemic perfusion that distinguish a candidate's relative health. Evidence might include feeding intolerance or the need for noninvasive respiratory support like hyponasal cannula, Continuous Positive Airway Pressure (CPAP) device, a Bilevel Positive Airway Pressure (BiPAP) device.

<sup>14</sup> Magnosta, DA, Godown, J, West, S, et al. Impact of the 2016 revision of US Pediatric Heart Allocation Policy on waitlist characteristics and outcomes. *Am J Transplant.* 2019;19:3276–3283. p. 3281. <https://doi.org.proxy.library.vcu.edu/10.1111/ajt.15567>

<sup>15</sup> Robinson, Mahle, Davies, "Increasing Use of Exceptions After Changes to Pediatric Heart Allocation," presentation to the American Transplant Conference, June 4, 2018, slide 26.

<sup>16</sup> OPTN, Thoracic Organ Transplantation Committee, meeting summary, January 28, 2020.

<sup>17</sup> Conway J, St Louis J, Morales DL, Law S, Tjossem C, Humpl T. Delineating survival outcomes in children <10 kg bridged to transplant or recovery with the Berlin Heart EXCOR Ventricular Assist Device. *JACC Heart Fail.* 2015;3(1):70-77. doi:10.1016/j.jchf.2014.07.011

Candidates with progressive pulmonary hypertension often need non-invasive positive pressure ventilation, not because of poor systemic perfusion but because the candidates have significant collapse due to cardiomegaly. Pulmonary vascular resistance (PVR) is often mentioned in exception requests but was excluded from the criteria for being too vague of an indicator. Excluding PVR and other vague criteria supports the guidance’s objective to limit exceptions in order to grant them to the candidates who are declining rapidly and who would ideally get a transplant instead of a VAD.

### *Candidates 10 kg and More*

For this population, the primary reason to provide a 1A exception is the presence of contraindications to mechanical circulatory support. The proposed guidance document lists criteria that would demonstrate to a review board that a candidate has either contraindications to a VAD or indications that inserting a VAD would be very high-risk.

In cases where a candidate is listed at a transplant program where staff may be uncomfortable inserting VADS, the guidance does not prohibit a transplant program from requesting an exception for a candidate receiving two inotropes, and that such requests could be reviewed on a case-by-case basis. Transplant programs may provide hemodynamic criteria justifying the use of a second inotrope to ensure the second inotrope was not used solely to make a candidate eligible for an exception.

## Hypertrophic/Restrictive (HCM/RCM) Cardiomyopathy

This part of the guidance is to serve the population of HCM/RCM candidates whose Status 1A exception requests were denied under the pediatric heart allocation changes implemented in 2016. Specifically, HCM/RCM candidates without a Status 1A exception “had increased cumulative incidence of death on the waitlist following” the 2016 changes in allocation policy.<sup>18</sup> The proposed guidance aims to decrease the high degree of variability in approval for cardiomyopathy under Status 1A exceptions.<sup>19</sup>

This category combines guidance for HCM and RCM candidates and identifies the following criteria as supporting the need for approving a Status 1A exception request: candidate is on inotropes, at risk for premature death, particularly unexpected sudden death, experiencing syncopal episodes, or showing evidence of increased pulmonary vascular resistance. The existing guidance document for adult HCM/RCM cardiomyopathy exception requests was used as a starting template and amended to address the specifics of pediatric heart candidates.<sup>20</sup>

Guidance addressing this candidate population should help the pediatric heart transplant programs as well as the NHRB for Pediatrics members in two ways. First, by clarifying that such candidates likely qualify for an exception to the clinical requirements established in policy. Second, HCM/RCM candidates would benefit by better defining the population of Dilated Cardiomyopathy (DCM) patients who qualify for a Status 1A exception.

<sup>18</sup> Magnetta, DA, Godown, J, West, S, et al. Impact of the 2016 revision of US Pediatric Heart Allocation Policy on waitlist characteristics and outcomes. *Am J Transplant*. 2019; 19:3276–3283. <https://doi-org.proxy.library.vcu.edu/10.1111/ajt.15567>

<sup>19</sup> OPTN Thoracic Organ Transplantation Committee, meeting summary, September 24, 2019.

<sup>20</sup> OPTN, *Review Board Guidance for Hypertrophic/Restrictive (HCM/RCM) Cardiomyopathy Exception Requests*, October 2018, [https://optn.transplant.hrsa.gov/media/2637/thoracic\\_guidance\\_review\\_board\\_hcm\\_rcm\\_201806.pdf](https://optn.transplant.hrsa.gov/media/2637/thoracic_guidance_review_board_hcm_rcm_201806.pdf) (accessed June 5, 2020).

Multiple criteria is listed in addition to inotrope use so as not encourage clinicians to give inotropes to patients unnecessarily. Formerly, requiring one or more inotrope could qualify a candidate for Status 1A. However, the 2016 changes eliminated inotrope usage as qualifying criteria for this population, potentially increasing waiting list mortality as this access point to a higher status was no longer available.<sup>21</sup>

Pediatric RCM candidates with syncopal events, refractory ventricular arrhythmias/implantable cardioverter defibrillator firing, elevated pulmonary vascular resistance, and/or inotrope treatment should be considered for listing at Status 1A. For HCM candidates, increasing frequency of arrhythmia is an indication that a candidate should be elevated to Status 1A.

## Single Ventricle Heart Disease

Single ventricle heart disease is included in the guidance although it is a relatively small population of candidates. As a result, waiting list mortality information for this category of candidates is limited. The decision to include it in guidance was based in part on questions from the pediatric community regarding a perceived incongruity in current policy for single ventricle candidates. A candidate who is listed at 17 years old as a Fontan, without being on inotropes in the hospital, is assigned to pediatric Status 2, but if the candidate is 18 years old at the time of listing, the candidate is assigned to adult Status 4, which is broadly equivalent to pediatric Status 1B.

Most Fontan candidates, who would typically qualify for Status 2, either get approved for pediatric Status 1B by exception, or the candidates receive an exception for pediatric Status 1A after being admitted to the hospital and administered inotropes. In light of this, the guidance is written broadly so that if a candidate is admitted and experiencing complications, like protein-losing enteropathy (PLE) or plastic bronchitis, then pediatric Status 1A is appropriate. However, if the candidate is not admitted but is a Fontan with complications, then pediatric Status 1B is appropriate.

The guidance document for adult congenital heart disease states that single ventricle candidates admitted to the hospital with complications like PLE can be upgraded to Status 3 by exception.<sup>22</sup> Status 3 shares many of the same clinical criteria as pediatric Status 1A including the qualifying condition of being supported by multiple intravenous inotropes or a high dose of a single intravenous inotrope. Based on the comparison of the two statuses, pediatric Status 1A is the appropriate classification for admitted Fontan candidates experiencing complications. Many of these patients would already be in the hospital and qualify for a higher status by meeting other criteria.

While the population of Fontan candidates admitted to the hospital but not on inotropes is small, they are addressed in the proposed guidance based on several considerations. There are particular challenges associated with transplanting sick Fontan patients including a window of frailty in which they quickly become unsuitable candidates from a surgical standpoint. If such candidates are not assigned a higher status before being admitted to the hospital with inotropes, then their post-transplant survival may be low. In addition, donor selection for these candidates is tighter due to previous surgeries and reconstruction, and many of these candidates have antigens. The guidance support these candidates receiving a transplant sooner rather than waiting for them to decline to the point that they need inotropes.

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<sup>21</sup> OPTN, Thoracic Organ Transplantation Committee, meeting summary, February 25, 2020.

<sup>22</sup> OPTN, *Review Board Guidance for Adult Congenital Heart Disease (CHD) Exception Requests*, December 2017, [https://optn.transplant.hrsa.gov/media/2349/thoracic\\_guidance\\_201712.pdf](https://optn.transplant.hrsa.gov/media/2349/thoracic_guidance_201712.pdf) (accessed July 7, 2020).



## Coronary Allograft Vasculopathy (CAV) and Retransplant

CAV and retransplant patients do not have any particular prioritization under the current allocation system.<sup>23</sup> These candidates generally are assigned to Status 2. However, transplant programs ask for exceptions when they believe it is merited. Although this population is small and their conditions vary, CAV and retransplant candidates are included in the guidance document because such candidates are a high-risk population who tend to have higher waiting list mortality.

Of retransplant listings between October 1, 1987 and October 14, 2012, 63% were due to CAV<sup>24</sup>. Waiting list mortality for these retransplant candidates was 25.2%, 6.6% higher than candidates receiving their first heart transplant with the average wait time for retransplant being 3 months.<sup>25</sup>

Retransplant patients who are most medically urgent are those who have suffered an arrest event, warranting the approval for listing at Status 1A by exception. Candidates who are experiencing other symptoms suggesting that they are close to cardiac arrest are also included for Status 1A consideration in the guidance. Such symptoms might include non-sustained ventricular arrhythmias or unexplained syncope. Candidates with a history of revascularization for coronary allograft vasculopathy may be eligible for consideration at Status 1B.

## NOTA and Final Rule Analysis

The OPTN issues this guidance for the operation of the OPTN<sup>26</sup>. This guidance will support the operation of the NHRB by assisting the reviewers with evaluating exception requests. The OPTN Final Rule requires the Board to establish performance goals for allocation policies, including “reducing inter-transplant program variance.”<sup>27</sup> This guidance document will assist in reducing inter-transplant program variance in the performance indicators initially adopted by the Board when it established the NHRB. These performance indicators include: changes in the number and percent of pediatric candidates and transplant recipients by status, exception, age group, OPTN region, and diagnosis; changes in waiting list mortality rate for pediatric candidates by status and exception; changes in transplant rate for pediatric candidates by status and exception; the percent of approvals and denials for exception requests by status; and changes in post-transplant patient survival rates overall and stratified by status.<sup>28</sup>

## Implementation

The proposed guidance will require additional communication from the OPTN to both transplant programs and NHRB reviewers.

<sup>23</sup> OPTN, Thoracic Organ Transplantation Committee, meeting summary, February 25, 2020.

<sup>24</sup> Bock, Matthew J., Khanh Nguyen, Stefano Malerba, Kimberly Harrison, Emilia Bagiella, Bruce D. Gelb, Sean P. Pinney, and Irene D. Lytrivi. "Pediatric cardiac retransplantation: Waitlist mortality stratified by age and era." *The Journal of Heart and Lung Transplantation* 34, no. 4 (2015): 530-537.

<sup>25</sup> IBID.

<sup>26</sup> 2019 OPTN Contract Task 3.2.4: Development, revision, maintenance, of OPTN Bylaws, policies, standards and guidelines for the operation of the OPTN.

<sup>27</sup> 42 C.F.R. §121.8(b)(4)

<sup>28</sup> OPTN Briefing Paper: National Heart Review Board for Pediatrics. June 8, 2020.

[https://optn.transplant.hrsa.gov/media/3808/202006\\_thoracic\\_natl\\_heart\\_reviewboard\\_for\\_peds\\_bp.pdf](https://optn.transplant.hrsa.gov/media/3808/202006_thoracic_natl_heart_reviewboard_for_peds_bp.pdf) (accessed on June 24, 2020).

## Fiscal Impact

Minimal or no member impact.

## OPTN Actions

The OPTN will need to communicate the proposed guidance to all pediatric heart transplant programs and NHRB reviewers. Additional supplemental materials may be created to aid understanding.

## Member Actions

Pediatric heart transplant programs will need to ensure that staff responsible for submitting exception requests are familiar with the operational guidelines as well as the proposed guidance document.

## Post-implementation Monitoring

The Final Rule requires allocation policies to be “reviewed periodically and revised as appropriate.”<sup>29</sup> Although this proposal is not policy, it provides guidance to enhance the implementation of the National Heart Review Board for pediatric candidates. The following evaluation plan will provide the Committee with information on a periodic basis about whether the NHRB for pediatric candidates is achieving its goals, and whether any revisions are warranted.

The NHRB will be formally evaluated approximately 6 months, 1 year, and 2 years post-implementation. The following metrics, and any subsequently requested by the Committee, will be evaluated as data become available (Appropriate lags will be applied, per typical OPTN conventions, to account for time delay in institutions reporting data to UNet<sup>SM</sup>) and compared to an appropriate pre-policy cohort to assess performance before and after implementation of the NHRB.

- Examine changes in the number and percent of pediatric candidates by status, exception, age group, OPTN region, and diagnosis
- Examine changes in the number and percent of pediatric transplant recipients by status, exception, age group, OPTN region, and diagnosis
- Evaluate changes in waiting list mortality rate for pediatric candidates by status and exception
- Evaluate changes in transplant rate for pediatric candidates by status and exception
- Report the percent of approvals and denials for exception requests by status
- Examine changes in post-transplant patient survival rates overall and stratified by status

## Conclusion

This guidance document aims to assist future NHRB members in their decision making when they receive exception requests for pediatric candidates with the diagnoses of dilated cardiomyopathy, hypertrophic or restrictive cardiomyopathy, single ventricle heart disease, and coronary allograft vasculopathy and retransplant. This document also provides guidance to the transplant program submitting the request on these candidates’ behalf to improve the efficiency of the review process. The ultimate goal is to ensure that these medically urgent, unique candidates are reviewed consistently by NHRB members and that the information provided by the transplant program provides enough appropriate detail for the NHRB members to make an informed determination.

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<sup>29</sup> 42 C.F.R. §121.8(a)(6).

## Feedback Questions

The Committee welcomes additional feedback on the proposed guidance, including the following:

1. Are there other contraindications to the use of a Ventricular Assist Device (VAD) that should be considered?
2. What, if any, measure of sensitization could be included to assist in determining whether a Coronary Allograft Vasculopathy candidate should be considered for Status 1A listing by exception?

# Guidance for Pediatric Heart Exception Requests

## Diagnoses addressed in this Guidance

The guidance document was drafted with the goal of helping the members of the National Heart Review Board for Pediatrics standardize decision-making when reviewing exceptions requests for certain Status 1A and Status 1B candidates. The document provides guidance on the following pediatric heart diagnoses:

- Dilated cardiomyopathy
- Restrictive or hypertrophic cardiomyopathy
- Single ventricle heart disease
- Coronary vasculopathy allograft and retransplant

## Standard Information for Inclusion With Pediatric Heart Exception Requests

The following information provides useful guidance for transplant program staff responsible for completing the clinical narrative portion of an initial exception request or an extension exception request on behalf of a pediatric heart candidate. Transplant programs are expected to demonstrate that a candidate has both the medical urgency and potential for benefit comparable to that of other candidates at this status.<sup>30</sup>

Transplant programs are strongly encouraged to submit the following information as part of each exception request:

- Contain specific description of the candidate's current diagnoses and methods of support, inclusive of inotropes and mechanical circulatory support;
- Specifically describe how:
  - The candidate meets the exception criteria, or
  - Why standard therapies may not be ideal for the candidate and why the candidate's condition is not addressed by the pre-specified exception criteria
  - Describe why the current policy does not adequately account for the candidate's particular situation and high risk of waitlist mortality

The Committee realizes the guidance will not address all cases, but believes it will be a useful and practical tool for pediatric heart programs submitting requests. In addition, the guidance is intended to provide National Heart Review Board for Pediatrics members with a roadmap to certain, useful information necessary for making informed decisions.

## Category 1: Dilated Cardiomyopathy Patients

Most candidates with dilated cardiomyopathy, in the absence of specific criteria below, are appropriately categorized based on the need for inotropes as Status 1B or for mechanical circulatory support as Status 1A. Table 1 provides useful guidance for the review board asked to approve upgraded listing urgency by exception for children with dilated cardiomyopathy.

<sup>30</sup> OPTN, Adult heart status 2 exception criteria justification form. Accessed in UNet<sup>SM</sup> October 29, 2019.

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**Table 1: Recommended criteria for status exceptions**

<u>If the candidate has dilated cardiomyopathy and meets this criteria:</u>	<u>Then the candidate may be eligible for:</u>
<p><u>Is admitted to the transplant hospital that registered the candidate on the waiting list and meets <i>all</i> of the following criteria:</u></p> <ul style="list-style-type: none"> <li>• <u>Weighs less than 5kg</u></li> <li>• <u>Supported by <i>one</i> of the following:</u> <ul style="list-style-type: none"> <li>○ <u>A continuous infusion of at least one high-dose intravenous inotrope:</u> <ul style="list-style-type: none"> <li>▪ <u>Dobutamine greater than or equal to 7.5 mcg/kg/min</u></li> <li>▪ <u>Milrinone greater than or equal to 0.50 mcg/kg/min</u></li> <li>▪ <u>Epinephrine greater than or equal to 0.02 mcg/kg/min</u></li> </ul> </li> <li>○ <u>A continuous infusion of at least two intravenous inotropes:</u> <ul style="list-style-type: none"> <li>▪ <u>Dobutamine greater than or equal to 3 mcg/kg/min</u></li> <li>▪ <u>Milrinone greater than or equal to 0.25 mcg/kg/min</u></li> <li>▪ <u>Epinephrine greater than or equal to 0.01 mcg/kg/min</u></li> <li>▪ <u>Dopamine greater than or equal to 3 mcg/kg/min</u></li> </ul> </li> </ul> </li> </ul>	<p><u>Status 1A exception</u></p>
<p><u>Is admitted to the transplant hospital that registered the candidate on the waiting list and meets <i>all</i> of the following criteria:</u></p> <ul style="list-style-type: none"> <li>• <u>Weighs less than 10kg</u></li> <li>• <u>Supported by <i>one</i> of the following:</u> <ul style="list-style-type: none"> <li>○ <u>A continuous infusion of at least one high-dose intravenous inotrope:</u> <ul style="list-style-type: none"> <li>▪ <u>Dobutamine greater than or equal to 7.5 mcg/kg/min</u></li> <li>▪ <u>Milrinone greater than or equal to 0.50 mcg/kg/min</u></li> <li>▪ <u>Epinephrine greater than or equal to 0.02 mcg/kg/min</u></li> </ul> </li> <li>○ <u>A continuous infusion of at least two intravenous inotropes:</u> <ul style="list-style-type: none"> <li>▪ <u>Dobutamine greater than or equal to 3 mcg/kg/min</u></li> <li>▪ <u>Milrinone greater than or equal to 0.01 mcg/kg/min</u></li> <li>▪ <u>Dopamine greater than or equal to 3 mcg/kg/min</u></li> </ul> </li> </ul> </li> <li>• <u>Has poor systemic perfusion as evidenced by <i>any</i> of the following:</u> <ul style="list-style-type: none"> <li>○ <u>Need for non-invasive positive pressure ventilation</u></li> <li>○ <u>Feeding intolerance (inability to tolerate full enteral caloric requirement)</u></li> <li>○ <u>A decline in end-organ function (eg. Acute kidney injury)</u></li> </ul> </li> </ul>	<p><u>Status 1A exception</u></p>

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Among older and larger patients, the primary reason to provide a 1A exception should be the presence of contraindications to mechanical circulatory support. Such contraindications are often subjective and based on center experience. However, among the relevant considerations (even in the adolescent population who are overall likely to do well with a VAD) are: the presence of intractable life-threatening arrhythmias (despite normal electrolytes and intravenous anti-arrhythmic therapy), recurrent or severe gastrointestinal bleeding, recent or recurrent embolic or hemorrhagic stroke, dialysis-dependent patients requiring simultaneous heart-kidney transplant, hypercoagulable disorder, or the presence of a mechanical prosthetic valve.

53 Of note, given that there are no reliable predictors of RV failure after LVAD placement in pediatric  
 54 patients, the concern for the need for biventricular support would not generally be deemed a  
 55 contraindication to VAD placement.  
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## 57 Category 2: Restrictive or Hypertrophic Cardiomyopathy Patients

58 Patients with restrictive and hypertrophic cardiomyopathy may have higher mortality on the waitlist  
 59 when not receiving Status 1A exceptions. The following table (Table 2) provides useful guidance for the  
 60 review board when evaluating exception requests for candidates with these diagnoses.  
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62 **Table 2: Recommended criteria for status exceptions**

<u>If the candidate has restrictive or hypertrophic cardiomyopathy and meets this criteria:</u>	<u>Then the candidate may be eligible for:</u>
<p><u>Is admitted to the transplant hospital that registered the candidate on the waiting list and meets <i>any</i> of the following criteria:</u></p> <ul style="list-style-type: none"> <li>• <u>Supported by <i>one</i> of the following:</u> <ul style="list-style-type: none"> <li>○ <u>A continuous infusion of at least one high-dose intravenous inotrope:</u> <ul style="list-style-type: none"> <li>▪ <u>Dobutamine greater than or equal to 7.5 mcg/kg/min</u></li> <li>▪ <u>Milrinone greater than or equal to 0.50 mcg/kg/min</u></li> <li>▪ <u>Epinephrine greater than or equal to 0.02 mcg/kg/min</u></li> </ul> </li> <li>○ <u>A continuous infusion of at least two intravenous inotropes:</u> <ul style="list-style-type: none"> <li>▪ <u>Dobutamine greater than or equal to 3 mcg/kg/min</u></li> <li>▪ <u>Milrinone greater than or equal to 0.25 mcg/kg/min</u></li> <li>▪ <u>Epinephrine greater than or equal to 0.01 mcg/kg/min</u></li> <li>▪ <u>Dopamine greater than or equal to 3 mcg/kg/min</u></li> </ul> </li> </ul> </li> <li>• <u>Has had an episode of sudden death or recurrent prolonged runs of hemodynamically significant arrhythmia that are not controlled by medical therapy</u></li> <li>• <u>Has had syncopal episodes felt to be related to restricted ventricular filling</u></li> <li>• <u>Has evidence of increased pulmonary vascular resistance (exceeding 6 WU*m<sup>2</sup>)</u></li> </ul>	<p><u>Status 1A exception</u></p>

63

## 64 Category 3: Single Ventricle Heart Disease

65 Patients with congenital heart disease are not generally disadvantaged by the current allocation system,  
 66 where they receive 1A status as long as they are admitted and supported on continuous inotrope  
 67 infusions. However, because certain single ventricle adult transplant candidates have had an increase in  
 68 status (adult Status 4 [equivalent to pediatric 1B] for all congenital patients, with increased status  
 69 assignments under specific circumstances), this has resulted in the incongruous circumstance where the  
 70 same patient will have lower listing status as a child (< 18 years old) than as an adult (≥ 18 years).  
 71 Accordingly, it appears appropriate to consider more urgent listing for many patients with single  
 72 ventricle congenital heart disease, even where not supported by inotropes as an inpatient.  
 73

74 To provide more congruity between adult and pediatric listings, the following table should assist the  
 75 National Heart Review Board members with evaluating exception requests for single ventricle congenital  
 76 heart disease patients:

77  
 78

**Table 3: Recommended criteria for status exceptions**

<u>If the candidate has single ventricle congenital heart disease and meets this criteria:</u>	<u>Then the candidate may be eligible for:</u>
<u>Is admitted to the transplant hospital that registered the candidate on the waiting list and is experiencing complications related to their congenital heart disease (including but not limited to: protein-losing enteropathy, plastic bronchitis, or Fontan circuit thrombosis), and is actively receiving therapy for said complication, without regard for change in the candidate’s cardiac support</u>	<u>Status 1A exception</u>
<u>Has been palliated through a Fontan procedure and is listed for heart transplantation</u>	<u>Status 1B exception</u>

79

## 80 Category 4: Coronary Allograft Vasculopathy and Retransplantation

81 Patients with a prior transplant do not have specific criteria within policy for qualifying for an urgency  
 82 status higher than Status 2. However, many patients with coronary allograft vasculopathy develop a  
 83 significant component of restrictive physiology and may not benefit from inotropes. Many patients with  
 84 coronary allograft vasculopathy may have poor outcomes and a high-risk for sudden cardiac death  
 85 without significant systolic dysfunction.

86  
 87

**Table 4: Recommended criteria for status exceptions**

<u>If the candidate has a prior heart transplant and evidence of chronic rejection or significant coronary allograft vasculopathy and meets this criteria:</u>	<u>Then the candidate may be eligible for:</u>
<u>A history of recent cardiac arrest, or signs or symptoms placing patients at high-risk for sudden cardiac death, including any of the following:</u> <ul style="list-style-type: none"> <li>• <u>A diagnosis of severe triple vessel disease, or</u></li> <li>• <u>Significant restrictive hemodynamics</u></li> <li>• <u>Non-sustained ventricular tachycardia</u></li> <li>• <u>Unexplained syncope</u></li> <li>• <u>Inotrope dependence</u></li> </ul>	<u>Status 1A exception</u>
<u>A history of revascularization (either surgical or transcatheter) for coronary allograft vasculopathy</u>	<u>Status 1B exception</u>

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