

## Paediatric Cardiology

### Carvedilol Prescription in Children with Chronic Heart failure

Staff relevant to:	Medical & Nursing staff working within EMCHC
Written by:	Dr S Shebani, Dr Rao; updated By Dr Badawy
Reviewed by:	Vicky Worthy (Pharmacist), Dr S Shebani
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## **1. Introduction and Who Guideline Applies to:**

Catecholamine levels are increased in patients with heart failure and cardiomyopathy, which has deleterious effects on heart muscle. Studies show that adults with dilated cardiomyopathy benefit from carvedilol with an increase in heart function, improved well being, and increased life span. These are probably related to remodeling of the heart muscle and after load reduction. It may take 4-6 months for these positive changes to occur.

In short term, the decrease in heart muscle contractility can make patients feel fatigued and unwell, and can cause severe hypotension; hence carvedilol should be started in a very small dose and increased gradually. If the patient experiences side effects then the dose is reduced to the previous level and increased at a smaller increment- side effects tend to be associated with the magnitude of dose increase rather than the absolute dose.

Carvedilol is a non selective beta blocker with alpha blocking action.

Beta blocking action reduces heart rate and cardiac contractility

Alfa blocking action causes peripheral vasodilatation.

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### ***Pharmacokinetics***

Elimination half life

Children<3.5y                    2.2h

Children>3.5y                   3.6h

Adults                            5.2h

Elimination processes dependent on hepatic blood flow

Absorption time: 0.5-2.5h

## **2. Guideline Standards and Procedures**

### **2.1 Indications**

Chronic congestive heart failure with left ventricular dysfunction secondary to cardiomyopathy or congenital heart disease

**To be used with caution for univentricular hearts especially with RV morphology and systemic right ventricle morphology (1)**

### **2.2 Contraindications to carvedilol use:**

Absolute: history of asthma

Relative: Severe congestive heart failure unresponsive to diuretics and ACE inhibitors.

### **2.3 Side effects of Carvedilol**

**Common :**                    Hypotension, bradycardia, dizziness, headache

**Less common :**            Tiredness, Vomiting, dyspnea, oedema

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## **2.4 Cautions**

- Acute or decompensated heart failure requiring intravenous inotropes
- Diabetes
- Hypotension for age
- Bradycardia for age

## **2.5 For patients also taking digoxin:**

Carvedilol may reduce the clearance of digoxin, increasing serum concentrations by 10-20%

Digoxin levels should be taken 7-14 days following the initiation of carvedilol and dose adjusted accordingly.

Patients/carers should be counselled on signs of digoxin toxicity e.g. vomiting, anorexia.

## **2.6 Initial dose:**

Carvedilol treatment is initiated by consultant Paediatric cardiologist only.

Admit to ward 1 for baseline tests and observations: U&E's, BP, HR, ECG, CXR  
Echocardiography- review/discuss with cardiology registrar/consultant

Dose of Carvedilol for initiation of treatment:

### **0.05mg/kg/dose twice daily for 2 weeks.**

Prescribe the correct dose and all other medications of the child in drug chart on (Emed)

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## **2.7 Pre-Administration**

**The following must be completed before the first dose is given:**

- Nursing and medical admission completed
- Resuscitation sheet in patient's notes and emergency equipment at bedside
- Family are aware of reason for admission and importance of staying on the ward/Day Stay area after medicine given
- Baseline observations taken (Heart rate, Respiratory rate, Blood pressure, temperature and Oxygen saturations if required)
- Carvedilol dose is clearly prescribed on Medication Administration sheet with BP parameters clearly documented by medical staff
- Monitor renal function

## **2.8 Administration**

- Carvedilol should be taken with food.
- Tablets (3.125mg; 6.25mg; 12.5mg; 25mg) may be dissolved in water and the appropriate proportion taken to administer the dose a new tablet should be used for each dose
- Carvedilol oral suspension 5mg/5ml is available **for discharge medication or outpatient use.**

## **2.9 Clinical Care and Observations during initiation**

- Monitor blood pressure and heart rate 1 hourly for 6-8 hours after the first dose
- Monitor blood pressure and heart rate 4 hourly after subsequent doses
- Notify medical staff of a significant drop in systolic and mean blood pressure(usually > 20 mm of Hg from base line)
- Urgent medical attention if child is symptomatic: dizzy, pale, altered level of consciousness, profound hypotension/ bradycardia, tachycardia, capillary refill > 3sec, cool peripheries.)

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## **2.10 Subsequent Dose Increases**

**Dose escalation: approximately every 2 weeks (4 weeks in sick patients or those with severe left ventricular dysfunction).**

- Increase the dose every two weeks by 0.05 mg/kg/dose for the first increment, then by 0.1 mg/kg/dose for the next increment, aiming for a maintenance dose of 0.35 mg/kg/dose given twice daily (not more than 25 mg twice daily).
- If side-effects occur the dose should be adjusted at longer intervals and by smaller amounts.
- Patient should be admitted for each dose escalation
- Repeat echocardiography prior to every dose escalation.
- Inform parents, nurse in charge and book the patient in ward diary for next dose increase.
- Inform relevant Paediatric cardiology consultant of every admission and of any problems.
- Parents/ carer need to be educated on indication, administration and common side effects to look for: dizziness, nausea, vomiting, tiredness, dyspnea, oedema.)
- Ensure that the child has a clinic appointment following last increment of carvedilol dose.

## **3. Education and Training**

Familiarising staff with Monitoring

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#### 4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Prescribing errors	Reported via datix	Specialist Pharmacist/Ward Sister	Six monthly	Cardiology CPM

#### 5. Supporting References

1. amdani-et-al-2024-evaluation-and-management-of-chronic-heart-failure-in-children-and-adolescents-with-congenital-heart
2. Starship NZ. (2020) Clinical guidelines: carvedilol - observations after first dose.
3. Leeds Children's Hospital (2018) Guidelines on the use of Carvedilol in Children
4. **NPPG et al (2019) Carvedilol for heart failure**
5. Spicer, RL. Carvedilol – a new dimension in pediatric heart failure therapy. J Pediatr 2001; 138:457-8
6. Bruns, LA et al. Carvedilol as therapy in pediatric heart failure: An initial multicenter experience. J Pediatr 2001; 138(4): 505-511.
7. Shaddy, RE et al. The pediatric randomised carvedilol trial in children with chronic heart failure: Rationale and design. Am Heart J 2002; 144: 383-9.
8. Vaidyanathan, B. Is there a role for carvedilol in the management of pediatric heart failure? A meta analysis and e-mail survey of expert opinion. Ann Pediatr Cardiol v.2(1); Jan-Jun 2009
9. Christensen AH et al. Efficacy of carvedilol in pediatric heart failure. Future Cardiol 2013 Jul;9(4) 475-8
10. BNFc

#### 6. Key Words:

Heart failure, Carvedilol, Children's Cardiology

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<b>CONTACT AND REVIEW DETAILS</b>	
<b>Guideline Lead (Name and Title):</b> Dr S Shebani Paediatric Cardiologist	<b>Executive Lead:</b> Chief Medical Officer
<b>REVIEW RECORD</b>	
<b>Description Of Changes (If Any)</b> <b>5/7/24: Dose and monitoring remains the same updated the references and the cautions about use in univentricular hearts and systemic right ventricles</b>	