East Midlands Congenital Heart Centre

University Hospitals of Leicester NHS
NHS Trust

Paediatric Cardiology

Oral Propranolol Guideline

Staff relevant to:	Medical & Nursing staff working within EMCHC & PICU
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Contents

1. Introduction and Who Guidelines applies to:

This guideline applies to medical/clinical staff prescribing and administering oral propranolol to treat cardiac conditions in infants and children.

2. Guideline Standards and Procedures

2.1 Oral Propranolol

- Beta-blockers in general, block the beta adrenoceptors in heart, peripheral vasculature, bronchi, pancreas and liver.
- **Propranolol** is a nonselective beta-blocker (class II antiarrhythmic), acts at three important locations juxta-glomerular apparatus of the kidney to suppress the renin angiotensin system, central vasomotor centre to decrease systemic vascular resistance and on the myocardium to suppress contractility

Mechanism of action:

-Propranolol competitively blocks response to beta 1 and beta2 adrenergic stimulation resulting in lower HR, Lower BP, lower myocardial contractility and lower oxygen demand. It is also an inverse agonist reduces resting heart rate.

2.2 Indication:

- Cardiac arrhythmias -SVT
- Prevention of cyanotic spells in Tetralogy of Fallot patients.

2.3 Contraindications of use:

-Marked bradycardia see below for target heart rates
-Decompensated congestive heart failure
- Brittle and severe asthma
-Metabolic acidosis
-Severe peripheral arterial disease
-Six sinus syndrome
-2nd and 3rd° AV blocks
-Cardiogenic shock

Caution

Diabetes
First-degree heart block
History of obstructive airway disease
Myasthenia gravis
Portal hypertension
Psoriasis
Symptoms of thyrotoxicosis may be masked
In neonates and infants: use with feeds
Reduced oral intake.

2.4 Side effects:

-**Bradycardia** (patients at six sinus are more prone to severe bradycardia)
-**Hypoglycaemia (**reduces carbohydrate tolerance by decreasing insulin release)
-Hypotension
-**Reduced exercise capacity and tiredness**.
-May cause gastrointestinal upset,
-**Plasma lipid profile is altered on long-term use**- Total triglycerides and LDL cholesterol tend to increase while HDL cholesterol falls.
-Can accentuate **myocardial insufficiency** and precipitate congestive heart failure
-It **worsens chronic lung disease**, can **precipitate asthma**.
-Withdrawal of Propranolol after chronic use should be gradual to avoid rebound hypertension, worsening of angina or sudden death.

2.5 Dosage:

Arrhythmias

By mouth:

Neonate: 250 - 500 micrograms/kg PO TDS , adjusted according to response.

Child: 250- 500 micrograms/kg PO TDS - QDS (max per dose 1mg/kg QDS), adjusted to response; maximum 160mg per day.

Tetralogy of Fallot *

By mouth:

Propranolol can be started from a lower dose and then build up to optimised dose (as per cardiology consultant advice.)

Neonate: 0.25-1 mg/kg 2-3 times a day (max dose 2mg /kg TDS)

Child 1month – 11 years: 0.25-1mg/kg TDS - QDS, maximum dose to be given in divided doses; maximum 5mg/kg per day.

***TOF babies are at risk of cyanotic spells . UHL Connect guidelines to be followed if presented with such an emergency**. /PICU Cyanotic Spells (sharepoint.com)
Or
Please refer to previous pages of induction booklet page 34, section 3 .
" Management of cyanotic spells"

While prescribing propranolol, to be aware if child is on any other beta-blocker on a regular basis then in that case, speak to cardiology consultant to ascertain propranolol dose / alternative / if it is required at all .

Prescribing on eMeds, dose sentences for propranolol are built to reflect BNFC dosing.

2.6 Monitoring on the Ward:

After starting Propranolol or at every increment BP and HR are monitored hourly for 6 hours.

For neonates : it is important to monitor blood glucose levels and oral fluid intake . (Propranolol interferes with carbohydrate metabolism so there is risk of hypoglycaemia). To optimise dose with weight.

To do a pre-feed BM (blood sugars) for a baseline before starting propranolol and another pre-feed BM after propranolol administration and /or after any increment would be appropriate.
For high risk babies/ neonates please follow /refer to hospital/ neonatal guidelines on hypoglycaemia.

2.7 Target Heart Rates:

Monitor desirable Heart Rate response .

Below are normal heart rates in children (Hazinski 2013)
***Expect around 10% reduction with beta blockers*.**

Neonates: awake 100-180 bpm; sleeping 80-160 bpm
Infants (6 m): awake 100-160 bpm; sleeping 75 – 160 bpm
Toddler: awake 80- 110 bpm; sleeping 60-90 bpm
Pre-schooler: awake 70-110 bpm ; sleeping 60- 90 bpm
School age: awake 65- 110 bpm; sleeping 60 - 90 bpm
Adolescent: awake 60- 90 bpm; sleeping 50- 90 bpm

Education and Training

None identified at present

3. Monitoring Compliance

None identified at present

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Prescribing errors	Reported via datix	Specialist Pharmacist	Every six months	Cardiology CPM

5. Supporting References:

1.Texas children's handbook of CHD.2020, ISBN:978-1-7342721-0-9
(For introduction and mechanism of action of propranolol)

2. BNFC for dosage (propranolol hydrochloride)

3. Myung Parks Paediatric cardiology textbook/ handbook for reference

4. Hazinski 2013 et al (for normal heart rates in Children)

5. **Link to Guidelines page on UHL Connect:** UHL Trust Guidelines and Policies Library
For management of cyanotic spells. /PICU Cyanotic Spells (sharepoint.com)

6. Key Words:

Propranolol, Arrhythmias, Tetralogy of Fallot, Children's Cardiology

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title): Dr S Shebani Paediatric Cardiologist	**Executive Lead:** Chief Medical Officer
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