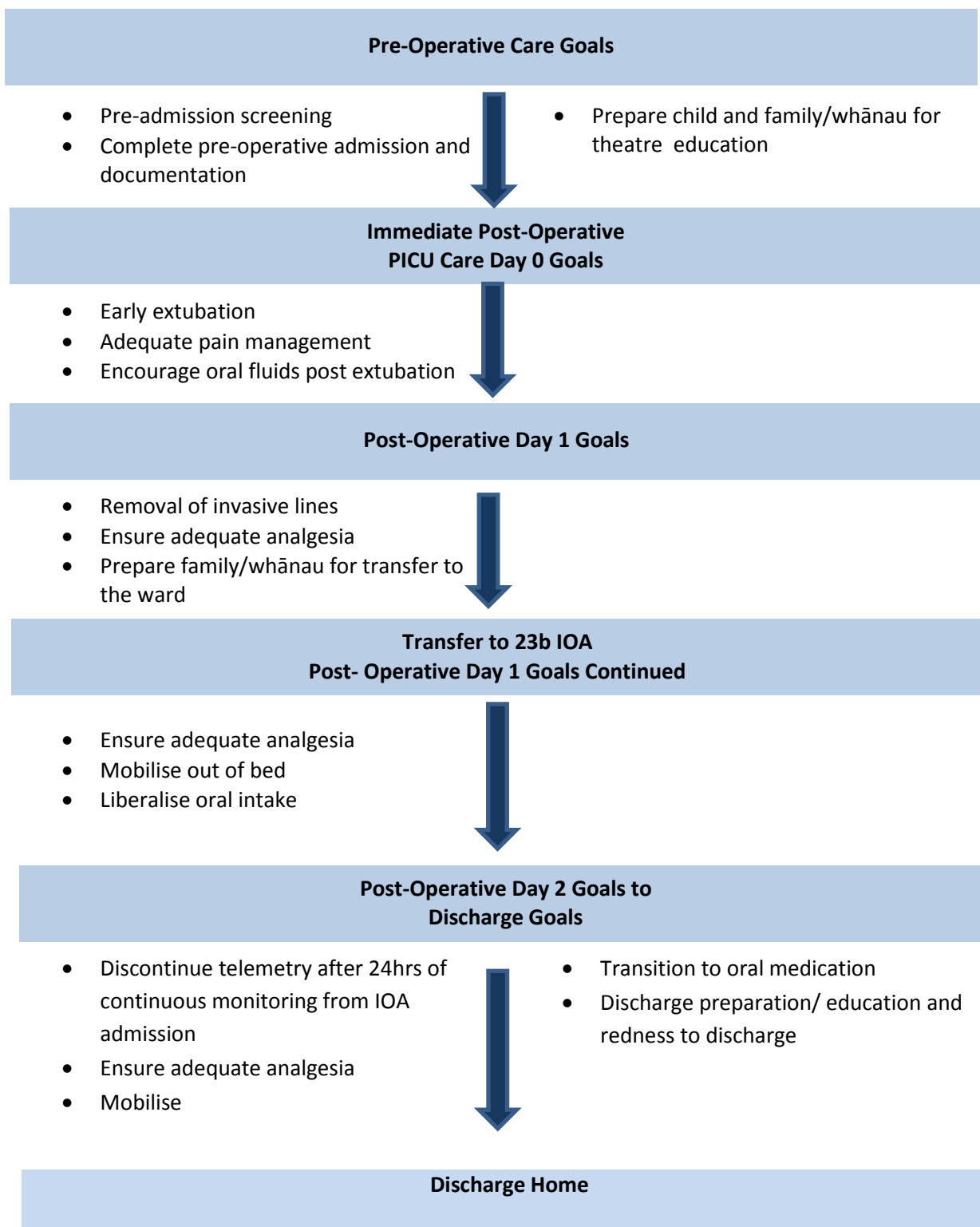


## Biventricular Pathway for 1 to 4 years

Expected length of stay 5 days



## Biventricular Clinical Pathway Inclusion/Exclusion Criteria

### Inclusion Criteria

1-5 years of age  
ASD -primum, secundum  
VSD -inlet,outlet, muscular  
Aortic and mitral valve repairs  
Conduit replacement  
Subaortic membrane  
AV canal  
Tetralogy of Fallot

Yes

**Patient eligible for clinical pathway**  
Document patient is to follow the clinical pathway in the notes

No

### Exclusion Criteria

Single ventricles  
1 1/2 ventricle repairs  
Children less than 1 year  
Children greater than 4 years  
Non bypass surgery

Patient is not eligible

### Variance

- The purpose of the variance record is to track and document variances from the clinical pathway

## Pre-Operative Care

**Goals:** Prepare pre-operative admission and documentation  
Family/whānau education

| Date                      | AM | PM |   | Clinical/Care decisions  |
|---------------------------|----|----|---|--|
| Preadmission screening    |    |    | <ul style="list-style-type: none"> <li>Commence anti-staph bundle if results are not available</li> <li>Overseas patients               <ul style="list-style-type: none"> <li>MRSA + MSSA screening (nasal and groin swab),</li> <li>MRO screening (rectal/faeces swab)</li> </ul> </li> <li>Patients transferred from other hospitals               <ul style="list-style-type: none"> <li>MRSA + MSSA screening</li> </ul> </li> </ul> | MRSA and MSSA results available Yes/No<br><br>Mupirocin commenced Yes/No |
| Medication management     |    |    | <ul style="list-style-type: none"> <li>Withhold ACE inhibitors and diuretics once NBM</li> <li>Antiarrhythmic and beta blocker should be given with a small sip of water unless specified by anaesthetist</li> <li>Aspirin should have been stopped 2-5 days prior to surgery</li> <li>Clopidogrel is stopped 5 days prior to surgery</li> <li>Anti-staph bundle – Mupirocin treatment</li> <li>Pre-medication charted</li> </ul>         |  |
| Pre-operative preparation |    |    | <ul style="list-style-type: none"> <li>Medical admission (see cardiac surgery admission guideline)</li> <li>Organise interpreter for consent if required</li> <li>If consent not completed done by 5pm Clinical Charge Nurse to follow up</li> <li>Shower and chlorhexidine wipe the night prior to surgery <b>and</b> morning of surgery</li> <li>Resus chart</li> <li>Ages and Stages assessment</li> </ul>                             |  |
| Nutrition                 |    |    | <ul style="list-style-type: none"> <li>Establish NBM times (see anaesthesia fasting guideline and cardiac surgery admission process guideline)</li> </ul>   |  |

### Clinical management

Does patient have any of the following

- Temp > 37.5
- Signs of chest infection
- Infected skin lesions
- Vomiting /diarrhoea for the last 24 hours
- Infectious contact. i.e. chicken pox, measles

### Recommended action

- Contact surgical Fellow/Registrar to review patient
- Theatre delayed or cancelled
- Recommence pathway once theatre date confirmed
- Document action in the clinical notes

## Day of Surgery

### PICU post-operative day 0

**Goals:** Early extubation  
Ensure adequate analgesia

| Date                              | AM | PM |   | Clinical/Care decisions  |
|-----------------------------------|----|----|---|--|
| <b>EXACT protocol</b>             |    |    | <ul style="list-style-type: none"> <li>EXACT as per 2 or 6 hour protocol</li> <li>Administer supplemental O2 to maintain SpO2 &gt;93-98%</li> <li>Identify patients suitable for early chest drain removal protocol on 20:00 ward round</li> <li>CLAB and Glamorgan score</li> </ul>  | Extubated as per EXACT<br>Yes/No   |
| <b>Pain management</b>            |    |    | <ul style="list-style-type: none"> <li>Aim for MAP's pain score of &lt;4</li> <li>Follow PICU unintubated greater than 12 months sedation and analgesia algorithm</li> <li>6 hrly paracetamol</li> <li>8 hrly ibuprofen unless contraindicated - can be administered on an empty stomach unless</li> <li>Antiemetic if child has postoperative nausea or vomiting (first line ondansetron)</li> </ul> | Regular 6 hrly paracetamol administered Yes/No<br><br>Regular 8 hrly ibuprofen administered Yes/No |
| <b>Fluid and diuresis</b>         |    |    | <ul style="list-style-type: none"> <li>Discontinue IV maintenance fluids post extubation</li> <li>Accurate fluid balance</li> </ul>   |  |
| <b>Nutrition</b>                  |    |    | <ul style="list-style-type: none"> <li>Once patient is cardiorespiratory stable, commence oral fluids and light diet as tolerated</li> <li>No fluid restriction is required</li> </ul>  |  |
| <b>Post-operative antibiotics</b> |    |    | <ul style="list-style-type: none"> <li>Cephazolin - 2 doses post-operative</li> </ul>   |  |
| <b>Family/whānau support</b>      |    |    | <ul style="list-style-type: none"> <li>Orientate family/whānau to PICU</li> <li>Surgical education post PICU admission</li> </ul>   |  |

|   |
|---|
| <b>Clinical management</b> <ul style="list-style-type: none"> <li>Diversion from the EXACT protocol, child no longer follows the pathway and care is managed as per care of the cardiac child PICU guideline</li> </ul>   |
| <b>Recommended action</b> <ul style="list-style-type: none"> <li>Care as per care of the cardiac child PICU guideline</li> <li>Sedation and pain management as per PICU intubated &gt;12months analgesia and sedation algorithm</li> <li>Recommence pathway once extubated</li> </ul> |

## Post-Operative Day 1 PICU

### Goals:

Ensure adequate analgesia  
Removal of chest drains and invasive lines

| Date  | AM | PM |  | Clinical/Care decisions   |
|---|----|----|--|---|
| Interventions                                     |    |    | <ul style="list-style-type: none"> <li>○ Wean O2 to maintain SpO2 &gt;93-98%</li> <li>○ Remove chest drains at 06:00 if patient meets early chest drain removal criteria or post-surgical ward round</li> <li>○ Post ward round remove <ul style="list-style-type: none"> <li>- Central line</li> <li>- Arterial Line</li> <li>- Foley catheter</li> </ul> </li> <li>○ Ensure 1x functioning IV cannula remains in-situ</li> <li>○ Complete CLAB and Glamorgan bundle of care</li> </ul> | Invasive lines removed<br>Yes/No  |
| Medication  |    |    | <ul style="list-style-type: none"> <li>○ Discuss medication management during surgical ward round <ul style="list-style-type: none"> <li>- Aspirin</li> <li>- Antiarrhythmics</li> <li>- Sildenafil</li> </ul> </li> </ul>   |   |
| Fluid and diuresis                                |    |    | <ul style="list-style-type: none"> <li>○ Commence BD IV frusemide 1mg/kg and potassium sparing diuretic if :</li> <li>○ K+ and creatinine are normal</li> <li>○ Accurate fluid balance</li> </ul>  |   |
| Pain management                                   |    |    | <ul style="list-style-type: none"> <li>○ Follow PICU un-intubated greater than 12 months sedation and analgesia algorithm</li> <li>○ 6 hrly paracetamol</li> <li>○ 8 hrly ibuprofen unless contraindicated</li> <li>○ Administer a dose of <b>oral</b> morphine post discontinuing PCA</li> <li>○ Administer anti-emetic if child has postoperative nausea or vomiting (first line ondansetron)</li> </ul>   | Regular paracetamol given Yes/No<br><br>Regular ibuprofen give Yes/no<br><br>PRN <b>oral</b> morphine given after stopping PCA Yes/No<br><br>If not, why? |
| Mobilisation                                      |    |    | <ul style="list-style-type: none"> <li>○ Mobilise up into a chair or sitting on caregiver prior to chest drain removal</li> </ul>  |   |
| Nutrition   |    |    | <ul style="list-style-type: none"> <li>○ Encourage oral fluids and home diet as tolerated</li> <li>○ No fluid restriction required</li> <li>○ Remove NG tube if child is tolerating oral medication</li> </ul>   |   |
| Diagnostic tests                                  |    |    | <ul style="list-style-type: none"> <li>○ Chest x-ray post drain removal</li> <li>○ Post-operative ECG prior to surgical ward round</li> </ul>  |   |
| PICU discharge documentation and patient handover |    |    | <ul style="list-style-type: none"> <li>○ Medical team to review chest x-ray post drain removal prior to transfer</li> <li>○ Discharge documentation completed including PEWS score, pain team and PaR team referral if required.</li> <li>○ PICU medical staff to call 23b admission phone and verbally handover to Registrar/NP prior to transfer</li> </ul>  |   |

**Clinical management**

- Failure to discharge from PICU due to change in clinical status

**Recommended action**

- Patient resumes pathway on day 1 post-op once clinical status stable and ready for transfer to 23b

## Post-operative Day 1 continued

### Ward 23B IOA admission

#### Goals:

Ensure adequate analgesia  
Mobilise up into a chair or sitting on caregiver  
Encourage nutrition

| Date                       | AM | PM | Day 1 Post Op  | Variance  |
|----------------------------|----|----|--|---|
| Interventions              |    |    | <ul style="list-style-type: none"> <li>○ Wean O2 to maintain SpO2 &gt;93-98% Medical admission, review diagnostics</li> <li>○ Continuous monitoring as per Starship Observations and Monitoring Guideline for 24hrs post IOA admission</li> </ul>                                      |   |
| Fluid diuresis             |    |    | <ul style="list-style-type: none"> <li>○ Review BD frusemide and potassium sparing diuretic</li> <li>○ Consider transitioning to oral diuretics</li> <li>○ Accurate fluid balance</li> </ul>   |   |
| Pain management            |    |    | <ul style="list-style-type: none"> <li>○ Use FLACC or revised faces pain scale to assess pain score</li> <li>○ 6 hrly paracetamol</li> <li>○ 8 hrly ibuprofen unless contraindicated</li> <li>○ Morphine PRN or Tramadol PRN</li> <li>○ Ondansetron for nausea and vomiting</li> </ul> | <p>Regular paracetamol given Yes/No</p> <p>Regular ibuprofen given Yes/No</p> |
| Mobilisation               |    |    | <ul style="list-style-type: none"> <li>○ Mobilise up into chair for meals or sitting on caregiver for enteral feeding</li> <li>○ Mobilise up to the toilet/mobilise around the bed</li> </ul>  |   |
| Nutrition                  |    |    | <ul style="list-style-type: none"> <li>○ Encourage oral fluids and soft/light diet</li> </ul>  |   |
| Daily needs bundle of care |    |    | <ul style="list-style-type: none"> <li>○ Glamorgan bundle of care</li> <li>○ Hygiene needs/oral care</li> </ul>  |   |
| Family/whānau support      |    |    | <ul style="list-style-type: none"> <li>○ Initiate family/whānau discharge education</li> <li>○ Support family/whānau to participate in child's care</li> </ul>   |   |

#### Clinical management

- Failure to discharge from PICU due to ward capacity

#### Action

- Patient continues on pathway in PHDU and can bypass the IOA if post-op day 1 goals have been achieved

## Post-Operative Day 2

### Goals:

Discontinue telemetry after 24hrs of continuous monitoring  
 Liberalise oral fluids and commence diet as age appropriate  
 Ensure adequate analgesia  
 Mobilise

| Date             | AM | PM | Day 2 Post Op  | Clinical/Care decisions  |
|------------------|----|----|--|--|
| Interventions    |    |    | <ul style="list-style-type: none"> <li>Discontinue telemetry if patient meets the below criteria               <ul style="list-style-type: none"> <li>Alert</li> <li>Electrolytes within normal levels</li> <li>Sinus rhythm within the last 24 hours</li> <li>Child is clinically stable and progressing as expected</li> </ul> </li> <li>Transfer out of IOA, if child is clinically stable and progressing as expected</li> <li>If sternotomy dressing is dry, remove dressing clean wound and apply glue</li> <li>Check diagnostic tests are completed for removal of pacing wires on day 3 post-op</li> <li>Commence lactulose OD if BNO</li> </ul> | Was telemetry discontinued day 2 post-op<br>Yes/No<br><br><i>If not why?</i> |
| Fluid diuresis   |    |    | <ul style="list-style-type: none"> <li>Transition to oral diuretics BD or daily if:               <ul style="list-style-type: none"> <li>Absorbing feeds</li> <li>No evidence of CHF</li> <li>Weight is tracking back towards pre-op weight</li> <li>No clinical signs of dehydration</li> </ul> </li> <li>Daily weight</li> <li>Accurate fluid balance</li> </ul>   | Transitioned to oral diuretics by day 2 post-op<br>Yes/No                    |
| Pain management  |    |    | <ul style="list-style-type: none"> <li>Use FLACC /revised faces pain scale to assess pain score</li> <li>6 hrly paracetamol</li> <li>8 hrly ibuprofen unless contraindicated</li> <li>Oral Morphine PRN or Tramadol PRN</li> <li>Ondansetron for nausea and vomiting</li> </ul>  | Transitioned to oral PRN morphine Yes/No                                     |
| Mobilisation     |    |    | <ul style="list-style-type: none"> <li>Mobilise into chair for meals or onto parents lap for enteral feeding</li> <li>Mobilise out of the room in the corridor, with parental assistance</li> <li>Refer to physiotherapy if patient is unable to sit out of bed by day 2 post-op</li> </ul>  | Mobilisation out of the room by day 2 post-op<br>Yes/No                      |
| Nutrition        |    |    | <ul style="list-style-type: none"> <li>Free fluids and normal home diet as tolerated</li> </ul>  | Achieved free fluids and light diet by day 2 post op<br>Yes/No               |
| Diagnostic tests |    |    | <ul style="list-style-type: none"> <li>Check FBC, U &amp; E's, and coagulation screen if having warfarin</li> </ul>  |  |



## Post-Operative Day 2 continued

| Date:                      | AM | PM | Day 2 Post Op continued  | Clinical/Care decisions |
|----------------------------|----|----|--|-------------------------|
| Daily needs bundle of care |    |    | <ul style="list-style-type: none"> <li>Bath or shower/oral hygiene</li> <li>Glamorgan bundle of care</li> </ul>  |                         |
| Infection surveillance     |    |    | <ul style="list-style-type: none"> <li>Pyrexia of &lt; 38.5 within 48 hours can commonly be associated with a SIRS response</li> <li>Ensure patient is hydrated and manage with paracetamol</li> </ul> |                         |
| Discharge education        |    |    | <ul style="list-style-type: none"> <li>Medication education</li> <li>Wound education</li> <li>Signs of when to seek medical review</li> <li>Parental education commenced by day 2 post-op</li> </ul>   |                         |

| Clinical management   |  |   |
|---|--|---|
| <b>Arrhythmias</b><br><br><b>Recommended action</b> <ul style="list-style-type: none"> <li>Consult with Cardiologist</li> <li>Delay pacing wire removal</li> <li>Continue ECG monitoring</li> <li>Check electrolytes</li> </ul> | <b>Oxygen requirement from day 3 post op</b><br><br><b>Recommended action</b> <ul style="list-style-type: none"> <li>Clinical examination</li> <li>Review last chest x-ray</li> <li>Consider fluid overload</li> </ul> | <b>Temperature &gt; 38.5°C &gt; 48 hrs post op</b><br><br><b>Recommended action</b> <ul style="list-style-type: none"> <li>Clinical examination</li> <li>FBC and urine (blood cultures and chest x-ray not routinely required)</li> </ul> |

## Post-Operative Day 3

### Or discharge if child meets discharge criteria

| Date                       | AM | PM | Day 3 Post Op   | Clinical/Care decisions   |
|----------------------------|----|----|---|---|
| Interventions              |    |    | <ul style="list-style-type: none"> <li>Remove pacing wires as per protocol if patient is clinically stable and progressing well</li> <li>Monitor for 2 hours post pacing wire removal, remove PIV 4 hours post pacing wire removal if the child is clinically stable</li> <li>Remove dressings on drain sites if dressings are dry</li> </ul> | Pacing wires removed on day 3 post-op Yes/No<br><br><i>If not, why?</i> |
| Fluid diuresis             |    |    | <ul style="list-style-type: none"> <li>Continue with oral diuretics BD or daily</li> <li>Daily weight</li> </ul>  | Transition to oral diuretics Yes/No                                     |
| Pain management            |    |    | <ul style="list-style-type: none"> <li>6 hrly paracetamol</li> <li>PRN ibuprofen unless contraindicated</li> <li>Oral Morphine PRN or Tramadol PRN</li> <li>Antiemetic if child has postoperative nausea or vomiting (first line ondansetron)</li> </ul>  | Transitioned to oral morphine Yes/No                                    |
| Mobilisation               |    |    | <ul style="list-style-type: none"> <li>Encourage as much mobilisation as possible</li> <li>Encourage as much mobilisation as possible/support family to mobilise the child independently</li> </ul>   |   |
| Nutrition                  |    |    | <ul style="list-style-type: none"> <li>Free fluids</li> <li>Encourage home diet</li> </ul>  |   |
| Diagnostic tests           |    |    | <ul style="list-style-type: none"> <li>Echocardiogram prior to discharge</li> <li>Consider repeating CXR if abnormalities are present on post-op CXR, consider PA and lateral views</li> </ul>  |   |
| Infection surveillance     |    |    | <ul style="list-style-type: none"> <li>Pyrexia of &lt; 38.5 within 48 hours can commonly be associated with a SIRS response</li> <li>Ensure patient is hydrated and manage with paracetamol</li> </ul>  |   |
| Daily needs bundle of care |    |    | <ul style="list-style-type: none"> <li>Hygiene needs/shower/Bath/teeth</li> <li>Glamorgan bundle of care</li> </ul>   |   |
| Discharge education        |    |    | <ul style="list-style-type: none"> <li>23b discharge check list completed</li> <li>Medication /Wound care and suture removal education</li> <li>Signs of when to seek medical review</li> </ul>   | Discharged by day 3 post-op Yes/No                                      |

| Clinical management   |  |   |
|---|--|---|
| <b>Arrhythmias</b><br><b>Recommended action</b> <ul style="list-style-type: none"> <li>○ Consult with Cardiologist</li> <li>○ Delay pacing wire removal</li> <li>○ Continue ECG monitoring</li> <li>○ Check electrolytes</li> </ul> | <b>Oxygen requirement from day 3 post op</b><br><b>Recommended action</b> <ul style="list-style-type: none"> <li>○ Clinical examination</li> <li>○ Review last chest x-ray</li> <li>○ Consider fluid overload</li> </ul> | <b>Temperature &gt; 38.5°C &gt; 48 hrs post op</b><br><b>Recommended action</b> <ul style="list-style-type: none"> <li>○ Clinical examination</li> <li>○ FBC and urine (blood cultures and chest x-ray not routinely required)</li> </ul> |

## Day 4 –discharge

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### Goals:

Family/whānau is confident caring for child on discharge  
Child meets the discharge criteria  
Discharge referrals completed

|                            |   |                                       |
|----------------------------|---|---------------------------------------|
| <b>Discharge criteria</b>  | <ul style="list-style-type: none"> <li>○ Ward 23b discharge check list completed</li> <li>○ Review medication prior to discharge</li> <li>○ Wound review and removal of sutures by the GP on day 7-10 post op</li> <li>○ If the wound has interrupted sutures, removal of sutures is organised by the surgical team at 14 days</li> </ul> | Discharged by day 4 post-op<br>Yes/No |
| <b>Discharge referrals</b> | <ul style="list-style-type: none"> <li>○ Home care nursing referral if required</li> <li>○ Neurodevelopment referral (see neurodevelopment follow up of cardiac patients guideline)</li> <li>○ Routine check by GP within the first week of discharge</li> </ul>  |                                       |

## Post Discharge Management

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|                             |   |
|-----------------------------|---|
| <b>Discharge management</b> | <ul style="list-style-type: none"> <li>○ Refer to SMO follow up guidelines</li> </ul> |
|-----------------------------|---|