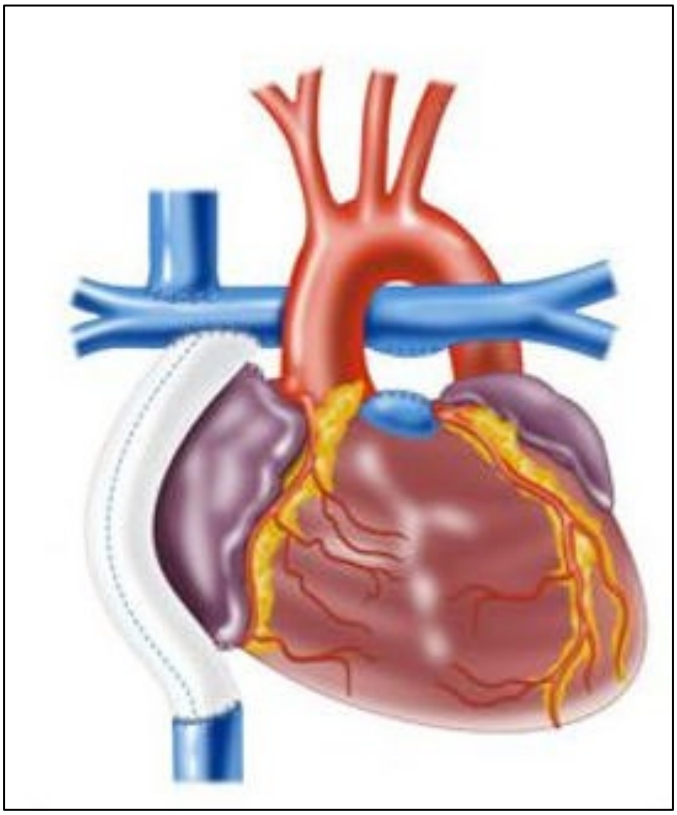
Te Whatu Ora Health New Zealand Te Toka Tumai Auckland | Starship Child Health

Patient Label

Fontan

Clinical Pathway

(Expected post-operative length of stay 12 days)



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Pathway Instructions	
Pathway	• Keep the pathway in the front of the clinical notes at all times. • Handover the pathway between shifts to ensure everyone is following it • Discuss the pathway at ward rounds • Complete the pathway each day and place a √ or x or N/A in the □ to confirm if a clinical care goal has been achieved • **If the PICU post-operative course has been longer than expected, continue to refer to the pathway as a guide for post-op care on transfer back to ward 23b.** • **Ensure routine nursing cares such as the admission checklist, wound care, hygiene (including bowel care), mobilisation and pressure injury care are maintained.**

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Instructions: place a √ or x or N/A in the ☐ to confirm if a clinical care goal has been achieved (√) or not (x) each day, or N/A if not applicable.						
Action:	**Date:**	**Location:**	**AM/PM/Ne**			
Pre-operative Management:	• Interpreter organised if required *(arrange pre-admission if able).* • Medications reviewed and withheld as per the 'Cardiac Surgery –admission process guideline'. • Check the consent form has been completed – inform CCN/coordinator if this has not been completed by 5pm. • NBM as per Starship fasting guideline. • Admitting doctor has completed the 'Pre-op Cardiac Surgical Checklist'. • Complete pre-operative paperwork. • Complete the 'Ward 23b Admission and Discharge Checklist' (including the anti-staph bundle).		☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐	**Pre-Op Surgical Planner for PCCS - Pre-admission notes:**

Clinical Management:	• Does patient have any of the following
	  • Temp > 37.5^{0}C
	  • Signs of chest infection
	  • Infected skin lesions
	  • Vomiting /diarrhoea for the last 24 hours
	  • Infectious contact. i.e. chicken pox, measles
	  • Has had a viral illness in the previous 2 weeks.
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	• If yes to any of the above contact the surgical fellow/registrar to review the patient • Surgery Deferred? **Yes / No (circle)**					
Comments:						

Patient Label

Post-operative PICU Cares – Fontan

Day 0 PICU until day of transfer to ward Date: _____

PICU Day 0 Post-op until transfer to ward 23b: **On return to PICU post-operatively follow standard PICU Clinical guidelines for care.** **In addition consider the following goals (achieved √/ not achieved x) until transfer to the ward occurs:**					
	Goal: Post-Op Day	**√/x AM/PM/Ne**			
Diagnostic Tests					
Routine bloods. ECG. CXR (on return from OT and post pleural drain removal, or if clinically indicated).	**0+** **1** **0+**				
Airway					
Wean from ventilation and extubate. Aim EXACT 2. Continue O_2 at 0.5LPM until **all** drains are removed.	**0** **0+**				
Drains					
Remove mediastinal drains. Split pleural drains Remove pleural drains as instructed by the surgical team.	**1** **1** **1+**				
Medications - *Avoid if possible concurrent prescriptions of more than 2 anticoagulants at a time*					
Inotropes as per the PICU medical team – ***consider commencing milrinone post extubation if:*** *BP stable, off all vasodilators and not requiring any dopamine or noradrenaline.* Cephazolin – 2 doses post-op Diuretics: frusemide IV 8 hourly and potassium sparing diuretic once daily.	**0-2** **0+** **1+**				
Low dose heparin once haemostasis secured, *i.e. drain output <1ml/kg/hr, unless specified by surgeon for early heparin infusion.* Commence BD enalapril if MAP acceptable. Commence aspirin Post-op Day 1. Six hourly paracetamol and 8 hourly ibuprofen (+morphine infusion as prescribed).	**0-2** **2+** **1** **0+**				
Input					
Fluid restrict to 50% of standard rate *(if PICU course exceeds day 1 post-op titrate up as directed – see transfer to ward page for guidance).* Low fat diet - in Trendcare select: Main diet: 'Child _x_ years', Modification: 'Low fat'.	**0** **1+**				

- **PICU (day of surgery): if the child is unstable ensure that the intensivist and surgeon are involved early.**
- **If draining >20mls/kg/24hrs (or >300mls in 24hours) child to remain in PICU, monitor CVP, fluid balance and electrolytes.**

Comments:

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Transfer to Ward 23b (Goal Post-op day 1) Date:_____

On the day of transfer to ward 23b ensure the following :	√/x AM/PM/Ne		
Diagnostic Tests/Education			
FBC, coags, and U&Es. ECG prior to ward round. Chest x-ray if clinically required.			
Invasive Lines/Equipment			
Remove: Arterial line Urinary catheter. Leave CVL and x1 peripheral IV access for ward 23b.			
Airway			
Continue O_2 at a minimum of 0.5LPM until **ALL** drains are removed*****. ***Oxygen should be removed when the child is being bathed, playing or mobilising unless clinically contraindicated.**			
Medications - *Avoid concurrent prescriptions of more than 2 anticoagulants at one time if possible*			
Continue milrinone (if applicable). Diuretics: frusemide IV 8 hourly and potassium sparing diuretic once daily *(see notes opposite).* Continue low dose heparin whilst CVL in situ. Aspirin once daily 3-5mg/kg. Continue 6 hourly paracetamol and 8 hourly ibuprofen. Continue PRN IV/oral morphine.			
Chest Drains			
Remove pleural drains if losses are less than 4mls/kg/drain/day for 2 consecutive days, no bubbling and as instructed by the surgical team. **If drains remain in on transfer to ward 23b: suction is continued on 1kPa for any remaining Redax drains; ensure drain is well secured to the patient**			
Fluids			
Fluid allowance = 80% total (IV and oral). Limit plain water intake to 200mls/day. Daily Weight.			

Nutrition			
Low fat diet - in Trendcare select: Main diet: 'Child _x_ years', Modification: 'Low fat'.			
Other			
PICU Nursing Discharge (CR9200) completed.			

Notes:

- **If the serum albumin is less than 25 g/L consider methods to increase dietary protein intake.**
- **Avoid IV albumin as it increases pleural drainage.**
- **Aim to continue TDS diuretics until post drain removal.**
- **Avoid adjusting diuretics based on a high urea, encourage oral fluids (up to the 80% fluid restriction).**
- **If creatinine is greater than 50umol/L, initially encourage oral fluids (up to the 80% fluid restriction), then consider adjusting the frequency of diuretics to BD.**
- **If blood sodium is low, reduce diuretics but DO NOT STOP. Increase the salt intake in the child's diet.**
- **If chest drainage is prolonged beyond 10 days, consider bumetanide instead of frusemide.**

Comments:

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Goals Post-op Day 2 – Ward 23b Date: _____

Goals Post-op Day 2 – Ward 23b

Instructions: place a √ or x or N/A in the column to confirm if a clinical goal has been achieved (√) or not (x) each day, or N/A if not applicable.			
Diagnostic Tests/Education	**√/x AM**	**PM**	**Ne**
U&Es* and coags. Repeat FBC if platelets <100 E+9/L *(pre POD3 pacing wire removal check)* CXR post pleural drain removal (if drains meet criteria). ECG. Fontan poster and Parent/Whānau Information leaflet provided. *** If the serum albumin is less than 25 g/L consider methods to increase dietary protein intake.** ***Avoid IV albumin as it increases pleural drainage.**			
Invasive Lines/Equipment			
Remove CVL 2 hours after stopping low dose heparin infusion. x1 Peripheral IV in situ.			
Airway			
Continue O_2 at a minimum of 0.5LPM until **ALL** drains are removed* ***Oxygen should be removed when the child is being bathed, playing or mobilising unless clinically contraindicated.**			
Monitoring			
Continue monitoring.			
Chest Drains			
Remove drains if losses are less than 4mls/kg/drain/day for 2 consecutive days, no bubbling and as instructed by the surgical team. • **Suction is continued on 1kPa for any remaining Redax drains; ensure drain is well secured to the patient** • **Transition to ambulatory drains as per the 'Chest drains – Ambulatory' guideline (no suction unless directed).**			

Medications - ***Avoid concurrent prescriptions of more than 2 anticoagulants at one time if possible***	**√/x AM**	**PM**	**Ne**
Wean off milrinone. Diuretics: frusemide IV 8 hourly and potassium sparing diuretic once daily **(see back page for further advice).** Commence enalapril BD **(see back page for dosing advice).** *If on sildenafil consider starting an ACE before discharge and continue the sildenafil until all other pathway medications/restrictions are weaned – d/w cardiologist.* Stop low dose heparin 2hours prior to CVL removal. Continue aspirin once daily. Continue 6 hourly paracetamol and 8 hourly ibuprofen. PRN IV/oral morphine.			
Fluids			
Fluid allowance = 80% total (IV and oral). Limit plain water intake to 200mls/day. Daily weight.			
Nutrition			
Low fat diet - in Trendcare select: Main diet: 'Child _x_ years' , Modification: 'Low fat' **NB: Encourage protein intake and avoid extreme low fat diet option.** **NB: If suspicious of a chyle leak discuss on-going dietary requirements with the surgeon/cardiologist and liaise with the dietitian.**			
Wounds			
Wound review with the surgical team.			
Mobilisation/Handling			
Up to a chair for all meals. Out of bed and encourage normal developmental play. Daily wash with assistance provided to parents for all cares as needed.			
Comments:			

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Goals Post-op Day 3 – Ward 23b Date:_____

Instructions: place a √ or x or N/A in the column to confirm if a clinical goal has been achieved (√) or not (x) each day, or N/A if not applicable.			
Diagnostic Tests/Education	**√/x AM**	**PM**	**Ne**
INR and U&Es*. CXR post pleural drain removal (if applicable). Commence discharge education, including anticoagulation teaching with the nurse specialists. *** If the serum albumin is less than 25 g/L consider methods to increase dietary protein intake.** ***Avoid IV albumin as it increases pleural drainage.**			
Invasive Lines/Equipment			
Remove pacing wires – *check platelet count prior to removal*. Remove remaining peripheral IV.			
Airway			
Continue O_2 at a minimum of 0.5LPM until **ALL** drains are removed*. ***Oxygen should be removed when the child is being bathed, playing or mobilising unless clinically contraindicated.**			
Monitoring			
Discontinue monitoring 2 hours post wire removal.			
Chest Drains			
Remove drains if losses are less than 4mls/kg/drain/day for 2 consecutive days, no bubbling and as instructed by the surgical team. • **Suction is continued on 1kPa for any remaining Redax drains; ensure drain is well secured to the patient** • **Transition to ambulatory drains as per the 'Chest drains – Ambulatory' guideline (no suction unless directed).**			
Comments:			

Goals Post-op Day 3 – Ward 23b

Medications - *Avoid concurrent prescriptions of more than 2 anticoagulants at one time if possible*	**√/x AM**	**PM**	**Ne**
Change to **oral** frusemide 8 hourly. Continue potassium sparing diuretic once daily **(see back page for further advice).** Continue enalapril BD **(see back page for dosing advice).** *If on sildenafil consider starting an ACE before discharge and continue the sildenafil until all other pathway medications/restrictions are weaned – d/w cardiologist.* Continue aspirin once daily. Commence warfarin [only if pacing wires removed] (aim INR 2.0-2.5) **(see back page for further advice for procedural care).** Continue 6 hourly paracetamol and 8 hourly ibuprofen. PRN oral morphine.			
Fluids			
Fluid allowance = 80% total (IV and oral). Limit plain water intake to 200mls/day. Daily weight			
Nutrition			
Low fat diet - in Trendcare select: Main diet: 'Child _x_ years' , Modification: 'Low fat' **NB: Encourage protein intake and avoid extreme low fat diet option.** **NB: If suspicious of a chyle leak discuss on-going dietary requirements with the surgeon/cardiologist and liaise with the dietitian.**			
Wounds			
Review all wounds.			
Mobilisation/Handling			
Up to a chair for all meals. Out of bed and encourage normal developmental play. Daily wash with assistance provided to parents for all cares as needed.			
Comments:			

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Goals Post-op Day 4 until drain removal – Ward 23b

Date:_____

Instructions: place a √ or x or N/A in the column to confirm if a clinical goal has been achieved (√) or not (x) each day, or N/A if not applicable.			
Diagnostic Tests/Education	**√/x AM**	**PM**	**Ne**
Daily INR and U+Es (including weekly albumin) *. CXR post pleural drain removal (if applicable). ECHO prior to discharge. Continue discharge education, including anticoagulation teaching. *** If the serum albumin is less than 25 g/L consider methods to increase dietary protein intake.** ***Avoid IV albumin as it increases pleural drainage.**			
Invasive Lines/Equipment			
n/a			
Airway			
Continue O_2 at a minimum of 0.5LPM until **ALL** drains are removed*. ***Oxygen should be removed when the child is being bathed, playing or mobilising unless clinically contraindicated.**			
Monitoring			
n/a			
Chest Drains			
Remove drains if losses are less than 4mls/kg/drain/day for 2 consecutive days, no bubbling and as instructed by the surgical team. • **Suction is continued on 1kPa for any remaining Redax drains; ensure drain is well secured to the patient** Date pleural drains removed: **L_____ R_____**			
Comments:			

Goals Post-op Days 4 until drain removal – Ward 23b

Medications - *Avoid concurrent prescriptions of more than 2 anticoagulants at one time if possible*	**√/x AM**	**PM**	**Ne**
Continue **oral** frusemide 8 hourly. Continue potassium sparing diuretic once daily **(see back page for further advice).** Continue enalapril BD **(see back page for dosing advice).** *If on sildenafil consider starting an ACE before discharge and continue the sildenafil until all other pathway medications/restrictions are weaned – d/w cardiologist.* Continue aspirin once daily (stop aspirin when INR >1.8). Continue warfarin [if pacing wires removed] (aim INR 2.0-2.5) **(see back page for further advice for procedural care).** Continue 6 hourly paracetamol. PRN ibuprofen (stop after 7 days of treatment). PRN oral morphine.			
Fluids			
Fluid allowance = 80% total (IV and oral) until **ALL** chest drains are removed. Limit plain water intake to 200mls/day Daily weight.			
Nutrition			
Low fat diet - in Trendcare select: Main diet: 'Child _x_ years' , Modification: 'Low fat' **NB: Encourage protein intake and avoid extreme low fat diet option.** **NB: If suspicious of a chyle leak discuss on-going dietary requirements with the surgeon/cardiologist and liaise with the dietitian.**			
Wounds			
Review all wounds daily. Wound review with surgical team prior to discharge. Chest drain sutures removed by post-op day 7-10.			
Mobilisation/Handling			
Support as much normal developmental play as possible. Support family to care for the child independently.			
Comments:			

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Patient Label

Goals Post drain removal until discharge – Ward 23b

Date:_____

Instructions: place a √ or x or N/A in the column to confirm if a clinical goal has been achieved (√) or not (x) each day, or N/A if not applicable.			
Diagnostic Tests/Education	**√/x AM/PM/Ne**		
Daily INR and weekly albumin check*. Recheck CXR 48hours post drain removal and as clinically indicated. ECHO prior to discharge. Continue discharge education, including anticoagulation teaching. *** If the serum albumin is less than 25 g/L consider methods to increase dietary protein intake.** ***Avoid IV albumin as it increases pleural drainage.**			
Airway			
Discontinue O_2.			
Medications - *Avoid concurrent prescriptions of more than 2 anticoagulants at one time if possible*	**√/x AM/PM/Ne**		
3 days post drain removal -Transition to **BD oral** frusemide. Continue potassium sparing diuretic once daily **(see back page for further advice).** Continue enalapril BD **(see back page for dosing advice).** *If on sildenafil consider starting an ACE before discharge and continue the sildenafil until all other pathway medications/restrictions are weaned – d/w cardiologist.* Continue aspirin once daily (until INR >1.8). Continue warfarin (aim INR 2.0-2.5 during first 3 week post-op period and then 2.0-3.0 long-term) **(see back page for further advice for procedural care).** Continue 6 hourly paracetamol. PRN ibuprofen (stop after 7 days of treatment). Stop morphine.			
Comments:			

Goals Post drain removal until discharge – Ward 23b

Fluids			
No fluid restriction. Limit plain water intake to 400mls/day. Daily weight.			
Nutrition			
Low fat diet - in Trendcare select: Main diet: 'Child _x_ years' , Modification: 'Low fat'			
Wounds			
Review all wounds daily. Wound review with surgical team prior to discharge. Chest drain sutures removed by post-op day 7-10.			
Mobilisation/Handling			
Support as much normal developmental play as possible. Support family to care for the child independently.			
Comments:			

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Day of Discharge Ward 23b cares Date: _____

Post Discharge Management

Instructions: place a √ or x or N/A in the column to confirm if a clinical goal has been achieved (√) or not (x) each day, or N/A if not applicable.			
Discharge criteria	**√/x AM**	**PM**	**Ne**
Compliant with low fat diet. Understands the need to continue low fat diet for: • 2 weeks post drain removal or • 4 weeks for patients who had chylous drainage. No fluid restriction but understands the need to limit free water to 400mls at home for 2 weeks post discharge. Ward 23b discharge check list completed. Review medication prior to discharge: • Regular paracetamol on discharge • Continue BD frusemide until first 1 month follow-up appointment • Continue OD spironolactone • Continue Enalapril BD until first 1 month follow-up appointment • If on sildenafil, continue until seen by cardiologist at first 1 month follow-up appointment • Continue warfarin (aim INR 2.0-3.0). If the sternal wound has interrupted/continuous sutures, removal of sutures is arranged by the surgical team at 14 days. Ensure dietary plan documented in the discharge summary. Post-op ECHO completed.			
Comments:			

Discharge Referrals	**√/x AM**	**PM**	**Ne**
Home care nursing referral. Neurodevelopment referral (see 'neurodevelopment follow up of cardiac patients' guideline). Routine check by GP within the first week of discharge.			
On-going follow-up			
Refer to the 'Follow up after Cardiac Surgery' guideline Consider early discharge follow-up in discussion with the cardiologist* **(circle the outcome below)** **e.g. to exclude pulmonary effusions* **Follow-up with (circle): Cardiologist OR Paediatrician** **In (circle): Early Follow-up (<4 weeks) OR Routine follow-up (approx. 4 weeks)**			
Comments:			

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Further Advice for Medication Management of the Post-operative Fontan Child

Management of diuretics:

Aim to continue TDS diuretics until post drain removal.

Avoid adjusting diuretics based on a high urea, encourage oral fluids (up to the 80% fluid restriction).

If creatinine is greater than 50umol/L, initially encourage oral fluids (up to the 80% fluid restriction), then consider adjusting the frequency of diuretics to BD.

If blood sodium is low, reduce diuretics but DO NOT STOP. Increase the salt intake in the child's diet.

If chest drainage is prolonged beyond 10 days, consider bumetanide instead of frusemide.

Management of ACE Inhibitors: Aim SBP >80mmHg.

Commence enalapril as per the 'Ace Inhibitors in Paediatrics' guideline and Reference Viewer.

Target dose range 0.05mg/kg/dose to 0.25mg/kg/dose twice daily, but depending on the clinical situation the dose can be increased to 0.5mg/kg/dose.
(Recommended m*aximum daily dose of enalapril is 1mg/kg/day up to 40mg – Reference Viewer).*

If the child was on an ACE inhibitor pre-op:
Commence the same ACE inhibitor at half the pre-operative dose and titrate up.

Anticoagulation management:

Prior to catheters or chest drain procedures, no changes to anticoagulation are required if INR ≤ 2.5. Do not withhold warfarin. If unsure discuss with the surgical team before adjusting the anticoagulation.