

# FONTAN CLINICAL PATHWAY

## EXECUTIVE SUMMARY

Physician Owner(s): Dr. Laura Ortmann, Dr. John Cramer, Dr. Melissa Wehrmann, Dr. Camille Hancock-Friesen



### Primary Objective

Standardize management of patients post-operatively after elective Fontan procedure in the Cardiac Care Unit (CCU) and effectively transition to an outpatient setting with a goal of reducing chest tube duration, reducing hospital length of stay, and decreasing need for hospital re-admission.

### Recommendations

- Patient population: All elective Fontan procedures, extubated in the operating room or shortly after CICU admission, off all vaso-pressors > 4 hours at 0700 AM POD 1 (excluding prophylactic vasopressin at 0.0002 mcg/kg/min).
- Patients will be initiated on the following regimen:

**F – IV FUROSEMIDE** 1mg/kg every 8h on POD 1<sup>1</sup>. Spironolactone/hydrochlorothiazide (aldactazide) 1mg/kg PO every 12 hours to be initiated when taking enteral liquids<sup>1,2</sup>. Transition to PO TID furosemide after chest tubes are removed. Diuretics will be weaned prior to discharge with a goal at discharge of 3-4 doses per day of diuretic. Goal for patients is to maintain electrolyte evidence of mild dehydration (near normal electrolytes, mild elevation in BUN, and normal creatinine).

**O** – Do not wean **OXYGEN** below 0.5 L/min via nasal cannula until chest tubes are removed<sup>1-3</sup>. PT/OT should be consulted to assist with ambulation; okay for patient to be off oxygen while ambulating.

**N** – Initiate **ENALAPRIL** 0.05mg/kg/dose every 12h when taking PO fluids<sup>3,4</sup>. Dose to be titrated up as needed for hypertension.

**T** – **CHEST TUBES** will be removed when drainage is < 2ml/kg/day for a single chest tube.

**A – ANTICOAGULATION** Patients will be placed on a heparin drip POD 0 (when 4 hours post op and chest tube output < 1 ml/kg/hour), maintain therapeutic Anti-Xa (0.3-0.7) until they are walking<sup>5,6</sup>. Start aspirin on POD 1 when taking PO<sup>7-9</sup>. If patient is not taking PO on POD#1, start aspirin as soon as they are tolerating enteral liquids. **ALTERNATIVELY**, consider rivaroxaban instead of aspirin once CTs are removed for a duration of 6 months (heparin should be stopped when rivoxaban started)<sup>10</sup>.

**N – NUTRITION** and fluids: On POD 1-3, when PO is initiated, restrict total fluids to 80% of maintenance<sup>1-3</sup> and maintain on a on fat free diet (<3 grams of fate). On POD #4 increase to maintenance fluids until chest tubes are removed and increase to fat allowance to < 30% of total calories until 4 weeks post op<sup>1</sup>.

**S – SET-UP Discharge:** Verbal hand-off to referring cardiologist. Patients should be instructed to maintain fluid restriction (~1.5 L/day) until seen by outpatient cardiologist. A CXR and BMP will be obtained 3 days after discharge for the referring cardiologist to review; expected cardiologist clinic visit within 1 week.

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### Rationale

- Safety: Will be maintained by close communication between CICU physician, ICU cardiologist, CT surgeon, CT surgery advanced practice providers, inpatient Cardiologist and inpatient Cardiology nurse
- Quality: Will be improved by reducing practice variation
- Cost: Will be reduced by reducing practice variation in treatment which can lead to potential increased LOS, morbidity and readmissions
- Engagement: Is created and supported by involvement of providers across the continuum of care that evaluate and treat cardiology patients
- Patient/Family Satisfaction: Shall be improved by providing the highest quality care based on established guidelines and the latest evidence available in the literature

### Metrics

#### Process metrics:

- Increase percent of patients started on aspirin on POD 1.
- Increase percent of patients discharged on a minimum of three times daily diuretics

#### Outcome metrics:

- Maintain median chest tube time of no more than 4 days.
- Decrease percent of patients readmitted for pleural effusions.

#### Balancing metric:

- No increase in number of patients readmitted for electrolyte derangements

### Team Members

Champions: Laura Ortmann, MD (Cardiology) & John Cramer, MD (Cardiology)

- Melissa Wehrmann, MD (Cardiology)
- Camille Hancock-Friesen, MD (Cardiothoracic Surgery)
- Emily McLouth, PharmD (Pharmacy)
- Brandi Robinson, APP (CCU)
- Kady Condrey, (Dietician)
- Katelyn Anderson, RN (CCU Nurse Navigator)
- Abbie Vollers, RN (Fontan Coordinator)
- Kristy Cook, APRN (Fontan Program)

### Evidence

1. Pike NA, Okuhara CA, Toyama J, Gross BP, Wells WJ, Starnes VA. Reduced pleural drainage, length of stay, and readmissions using a modified Fontan

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- management protocol. *J Thorac Cardiovasc Surg.* 2015;150(3):481-487. doi:10.1016/j.jtcvs.2015.06.042
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  9. Miwa K, Iwai S, Nagashima T. Anticoagulation Therapy After the Fontan Procedure. *Pediatr Cardiol.* 2022;43(6):1271-1276. doi:10.1007/s00246-022-02848-6
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**Disclaimer:** Pathways are intended as a guide for practitioners and do not indicate an exclusive course of treatment nor serve as a standard of medical care. These pathways should be adapted by medical providers, when indicated, based on their professional judgement and taking into account individual patient and family circumstances.